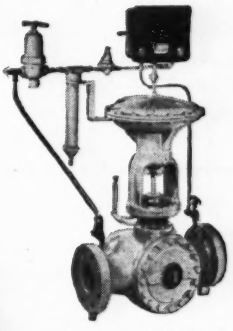
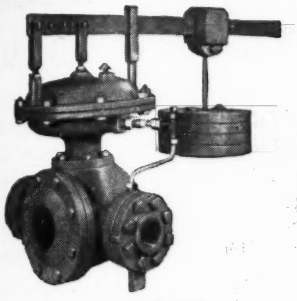
The ROCKWELL Replaceable Inlet Bowl

HIGH PRESSURE-015
Pilot Loaded

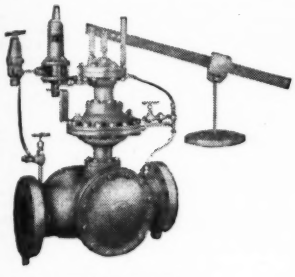


HIGH PRESSURE-015
Instrument Control

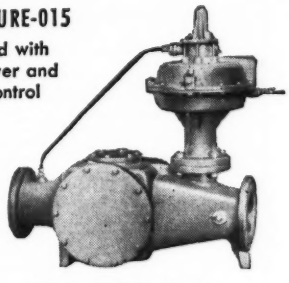
HIGH PRESSURE-015
Spring Loaded



HIGH PRESSURE-015
Lever and Weight Type

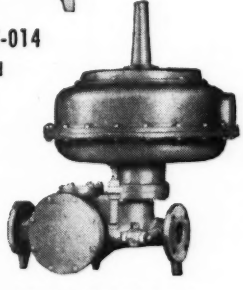


HIGH PRESSURE-015
Pilot Loaded with Auxiliary Lever and Weight Control



LOW PRESSURE-014
Pilot Loaded

A SIZE AND TYPE FOR EVERY NEED



LOW PRESSURE-014
Either inside or outside weights or pilot loaded

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Rockwell regulators rarely, if ever, need be lifted from the line for service. That's because the valve chamber (inlet bowl assembly) easily removes as a unit through a hand hole area in the body. A new or rebuilt assembly having either hard or soft seats readily bolts in its place. You can also use this feature to size a regulator up or down to take care of increased or decreased demands. Many utilities handle seasonal loads this way, at big savings in equipment inventory and labor. Contact the nearest Rockwell office for full details of this exclusive feature or write Rockwell Manufacturing Company, Pittsburgh 8, Pa. for bulletins.

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Balanced Valve REGULATORS

GAS

• *28th Year of Publication*

NOVEMBER 1952 • VOLUME XXVIII • NUMBER 11

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By pressing a switch, this man can raise or lower pressure anywhere in the Memphis Gas distribution system (see page 35).

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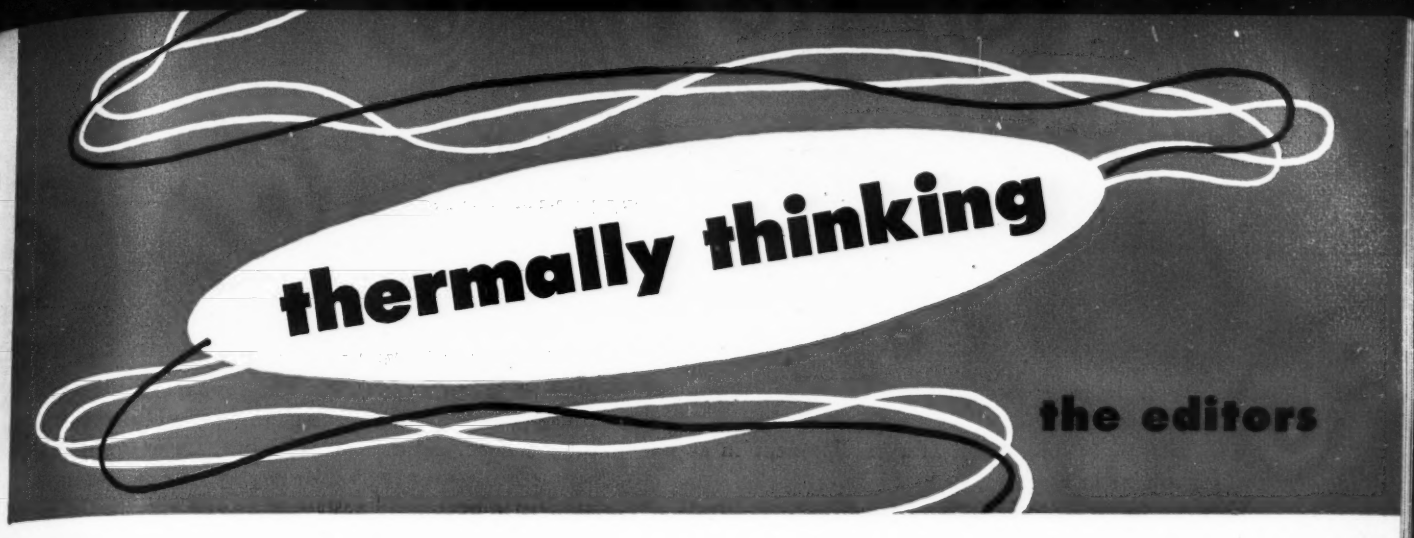


FPC Defends "Cost of Money" Theory

Washington

THOMAS C. BUCHANAN, the somewhat-temporary chairman of the Federal Power Commission, who likely is enjoying his last few months in office (barring a drastic change of sentiment in the Senate, which refused to approve him for the post last spring), figuratively has played Daniel-in-the-lion's-den by speaking before the Society of Security Analysts in New York. He devoted his speech mostly to earnings, and with particular reference to such recent decisions as those given by the FPC in the Northern Natural, Colorado Interstate and Mississippi River Fuel cases (see Pipeline Section).

Speaking to a packed meeting of the society, Mr. Buchanan said that the FPC has been "deluged" with mail as a result of its decisions in those cases. Much of this ranged from "mere curiosity" to charges of "an anti-business bias."

He declared that all rate-making necessarily is designed to limit earnings and to put a brake on market prices for utility securities, since the businesses regulated are natural monopolies. On the other hand, he said, the FPC is obligated to see that such monopolies enjoy a "reasonable" rate of return while preventing "purely speculative profits."

"Our approach to rate-making is not of our own devising," the FPC chairman declared, pointing out that it must be based on U. S. Supreme Court decisions. He expressed the opinion that the system has worked well in recent years and has not prevented either gas or electric utilities from obtaining needed capital "inasmuch as in the past six years they have gone through the period of their greatest growth without much difficulty."

Significantly, Mr. Buchanan pointed out that the FPC has not foresaken the principle of overall return on property in determining rates for interstate natural gas pipelines. Yet, he added, the commission never has committed itself to employing this principle exclusively, just as it never has guaranteed a 6% return to anyone.

"Cost of capital"—the amount necessary to be spent to raise money—is an "old and generally used" consideration in utility rate-making, the FPC chairman asserted, adding that there was absolutely no justification for the recent rash of statements that the FPC has departed from a long-time practice in using this principle in the Northern Natural, Colorado Interstate, and Mississippi River Fuel decisions.

New Rules for Rate Cases

Washington

THE FEDERAL POWER COMMISSION'S proposed rule specifying and limiting the type of information the agency will consider in future natural gas rate increase cases is creating quite a bit of talk among officials of the regulated gas companies and members of the Federal Power Bar Assn.

Unless changed by FPC, the new rule soon will go into effect. Interested parties may submit objections, views, or comments, not later than Nov. 21, 1952 (10 copies required).

Purpose of the rule change is to help the FPC to dispose of rate increase cases more quickly by insuring the submission of adequate and uniform supporting information, together with the rate increase applications.

Some sources here say that, on the other hand, the new rule apparently would make it easier for the agency to limit rate case presentation concerning two controversial methods of procedure.

The rule would require (1) "test year" information as to previous actual rate experience of the applicant; (2) data on the "cost of capital," included earnings-price ratios and other security market information for five years; (3) a summary of the overall cost of service (operating expenses, depreciation, taxes, and return); (4) rate base and rate-of-return summaries (with deductions for contributions in aid of construction) and claimed working capital (along with balances for materials and payments during the test period); (5) revenue deductions, including all claimed operating expenses, depreciation, taxes, etc., and (6) a summary of allocations of property and expenses which involve other than gas utility operations.

Observers here claim that the proposed rule implies that forecasts of revenues, rather than "test year" experience, may no longer be acceptable in rate cases. If this is the case, it would have followed a long-time trend in FPC and certain state commission procedures by means of which estimates or forecasts of future operations will not be considered in rate increase cases because of their uncertainty.

The advocates of the forecast method point out that adjusted past experience omits many costs which are predictable and undoubtedly will be experienced by the utility as

time passes. In other words, even if a utility knows that its union is getting ready to demand a whopping wage increase, it cannot "forecast" such a development in applying for a raise in rates.

The requirement for "cost of capital" data indicates, it is said here, that the FPC is prepared to give more weight in the future to the judgment of the stock market in determining the permissible rates of return. However, members of the FPC recently denied that the commission has left its established practice of predicating the return on a property cost rate base (in connection with the Northern Natural Gas Co. case).

Yet another change in FPC practice is seen in the requirement that the utility must be ready to go on with its case immediately upon filing its application, although the FPC may continue its practice of automatically suspending rate increases for the statutory five-month period. Thomas Buchanan, chairman (without Congressional approval) of the FPC, has criticized gas companies for trying to anticipate the lag by filing for rate increases which could not be justified at first, but probably would be approved in several months. This practice would be stopped by the proposed rule, which requires the applicant to "go forward immediately at a hearing and sustain the burden imposed by the Natural Gas Act." Some lawyers here see in the proposal an attempt to "freeze" the entire scope and content of rate base presentation.

The rule, it is pointed out, would not necessarily limit or outlaw any other or different type of data or evidence that applying companies might want to introduce, but, based on past experience, it indicates how the FPC is likely to rule on the admissibility of such other evidence.

No one can say, accurately, how widespread is the resentment against the new rule. There is quite a bit of talk among legal lights here who specialize in FPC cases, but whether or not strenuous objections are raised, or alternatives will be suggested to the FPC's new rule, is yet a matter of doubt.

Westcoast Officials Uneasy

Washington

A PIPELINE from the Alberta fields to Vancouver, B. C., and the British Columbia-Washington state border finally has been approved by the Canadian Board of Transport Commissioners at Ottawa, but Westcoast Transmission Co. officials, who intend to invest $111 million in Canada alone in the line, still are uneasy about FPC approval.

The Canadian board found that the line would be supported by an estimated reserve supply of at least 25 years in the expected markets in British Columbia and in the Pacific Northwest area of the U. S. The British Columbia market is not regarded as sufficient to swing the cost of the pipeline, but addition of the Washington state markets would do the trick, Westcoast officials are sure.

Dispatches here from Calgary, where the transmission company maintains Canadian headquarters, are to the effect that construction of the lines will start "immediately" upon approval by the FPC. If FPC approval comes within a reasonable time, the company can start work early next spring and have gas in Vancouver in 1953 and in U. S. markets in the fall of 1954. The Board of Transport Commissioners, in its decision, stated that the line must be completed before Oct. 31, 1955.

The Humes-Ignatieff report to the board stated that reserves in the Peace river area "may become even larger in a few years." It described the Fort St. John area, where most of British Columbia's reserves are located, as a "striking example of how rapidly gas is being found and developed."

It is believed strongly that the optimistic report on reserves, plus the favorable outlook of Canadian officials, will bear heavily on the forthcoming decision of the Federal Power Commission. FPC in mid-October had not ruled on whether or not to continue the Westcoast hearings, as had been promised earlier. The ruling—expected to be favorable to continue the hearings—was expected here momentarily, however.

Sidelights

Eight gas utilities and holding companies are among the select group of 81 in the United States that have paid dividends for 50 years or more, reports *Financial World* in its 50th anniversary issue. Providence Gas has the second best record of all U. S. companies with 103 years, and Washington Gas Light Co. is not far behind. Others in the select circle include Cincinnati Gas & Electric Co., Consolidated Edison of New York, Pacific Lighting Co., Philadelphia Co., Philadelphia Electric Co., and United Gas Improvement . . . Unless a decision was reached (after presstime) at the AGA convention, the future of public relations programs for both AGA and GAMA is still extremely clouded. GAMA needed more money to keep Carl Byoir's services and hoped to get the AGA into the program. Aims are pretty well established, but mechanics of the operation won't be decided by year's end.

technical trends

by guy corfield

Standards of Temperatures

Under the above title the National Bureau of Standards, in their Technical News Bulletin of July 1952, gives an interesting discussion of the scale of temperature that has been developed for precise temperature measurements. This International Temperature Scale was first adopted in 1927. Recently, because of the increasing necessity of accurate temperature measurement by industry as well as by science, particularly in the very low and very high ends of the scale, some refinements were felt necessary and were undertaken by the Bureau with the result that the International Temperature Scale of 1948 was adopted at Paris by the Ninth General Conference on Weights and Measures. The six fixed points on this Scale are:

Boiling point of oxygen	-182.97 °C
Freezing point of water	0.00
Boiling point of water	100.00
Boiling point of sulfur	444.60
Melting point of silver	960.80
Melting point of gold	1063.00

For temperatures below 660 °C the standard platinum resistance thermometer is used; from 660 °C to 1063 °C a platinum-platinum rhodium thermocouple is employed; and above 1063 °C measurements are made by optical pyrometer.

For basic maintenance of the International Temperature Scale the Bureau calibrates these three standard temperature measuring instruments and certifies them for use by other laboratories throughout the nation, who, in turn, use these certified instruments as working standards with which to calibrate commercial instruments. In addition, the Bureau calibrates other thermocouples as well as liquid-in-glass thermometers and ribbon-filament lamps and also a representative sampling of clinical thermometers, so that "practically all measurements of temperature above the oxygen point in this country are based upon the International Temperature Scale as established and maintained by the National Bureau of Standards."

Transition Engineering

IT HAS RECENTLY been announced that two well known firms, Arthur D. Little Inc. and Carrier Corp., have organized a newly created, jointly owned affiliate, the Cambridge Corp., set up to undertake what is called "transition engineering" or the transition of a product idea into profitable production.

It is stated that Cambridge Corp. offers to American industry a unique and necessary service which bridges the gap between research and development engineering on the one hand and the regular production for commercial purposes on the other. It is claimed that a void exists in this phase of industrial development and that this corporation, staffed from the parent organizations, is equipped to fill this void by virtue of ability to converse with and understand the point of view of the research and development team which originates a product and to follow this with manufacturing design and engineering, limited production, installation, operation and field testing of the product and, in addition, to look beyond to the utilization of this product. Services could begin at any development stage, such as with a customer's idea reduced to working drawings, or with a model or prototype, but in all instances would be carried through to practical manufacture or operation in limited quantities or scope.

Cambridge Corp. is located at 444 Somerville Ave., Somerville 43, Mass. Its mechanical division is housed in a plant of approximately 30,000 sq ft with head room of 35 ft. It is initially devoting particular attention to special pumps; applied physics and thermodynamics; instrumentation; and refrigeration, mechanical, metallurgical, chemical, filtration and low-temperature engineering (the latter concerned with the production of liquefaction equipment and the transportation and storage of liquefied gases).

Patent Laws Revised

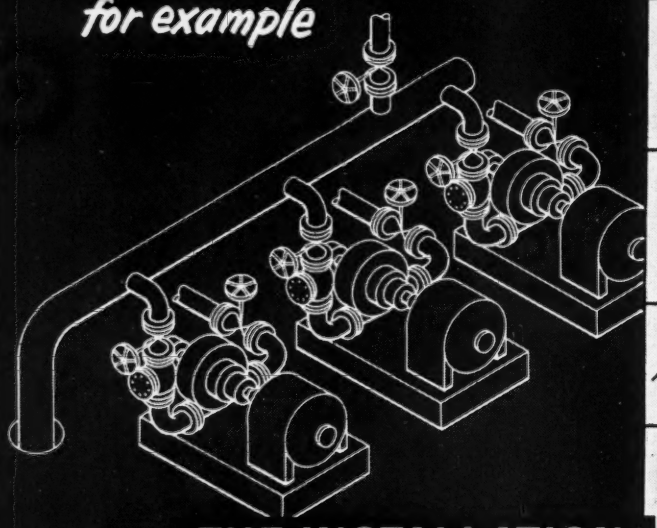
A new law, Title 35, United States Code, effective Jan. 1, 1953, embodies the first major revision of our patent laws since 1870. The revisions are designed to eliminate obsolete portions and to simplify and clarify the language and arrangement of the various sections.

One of the most important new provisions permits the issuance of a patent on a new use of an old and previously patented product. For example, if a chemical has been developed and patented for a certain use, a new use of the same chemical can now be patented. This will make it desirable for the inventor when presenting claims to list as many future uses as can be thought of so that possible new developments from the process or product cannot be patented by others.

The new law clarifies "contributory infringement," whereby one person illegally appropriates and uses or applies a part only of another's patented invention. Under the old law the inventor only was allowed to apply for a patent but the new law permits an authorized person, such as an employer, to file an application on behalf of the inventor. In general, the new provisions are considered to be favorable to the inventor and patent owner and should stimulate research and invention.

Can You Trust Your Checks to Hold Like This?

. . . on Water Pumps, for example



THE INSTALLATION

Crane Iron Body Swing Check Valves in 8-inch vertical lines on discharge side of water pumps supplying a large eastern paper mill.

VALVE SERVICE RATINGS

SUITABILITY:	Working smoothly - no complaints
FEATURES:	O.K. for either horizontal or upward flow
MAINTENANCE COST:	none - no maintenance needed to date
SERVICE LIFE:	Now better than other checks used
OPERATING RESULTS:	No water or head loss
PRICE:	In line with other makes
AVAILABILITY:	Stock item - Crane product

THE HISTORY

The mill depends on these pumps for all water. Loss of head at the pumps would create a serious problem. The mill could take no such risks. Regularly, the check valves on pumps were replaced, but only to be found leaking between pumping cycles, a few months later.

It's now more than a year since the change-over was made to Crane Check Valves. There's been no loss of water, no maintenance or replacement of any checks on the pumps. That was proof enough for the mill, that Crane Quality means better valves —greater dependability and bigger value. As a result, 3 more of these checks were installed on a separate battery of suction pumps.

THE VALVE

Crane No. 373, 125-Pound Iron Body Swing Check Valves, brass trimmed. The long life and high seating efficiency of these checks, in 2 to 8-in. sizes, is in large part due to the Crane patented flexible disc-hinge design. Double spring mounting eliminates lost motion between parts, yet permits true, full contact of disc and seat at every closure. Also serves to absorb the shock of seating under backflow pressure. See your Crane Catalog or Crane Representative for full details.

The Complete Crane Line Meets All Valve Needs. That's Why

More Crane Valves Are Used Than Any Other Make!

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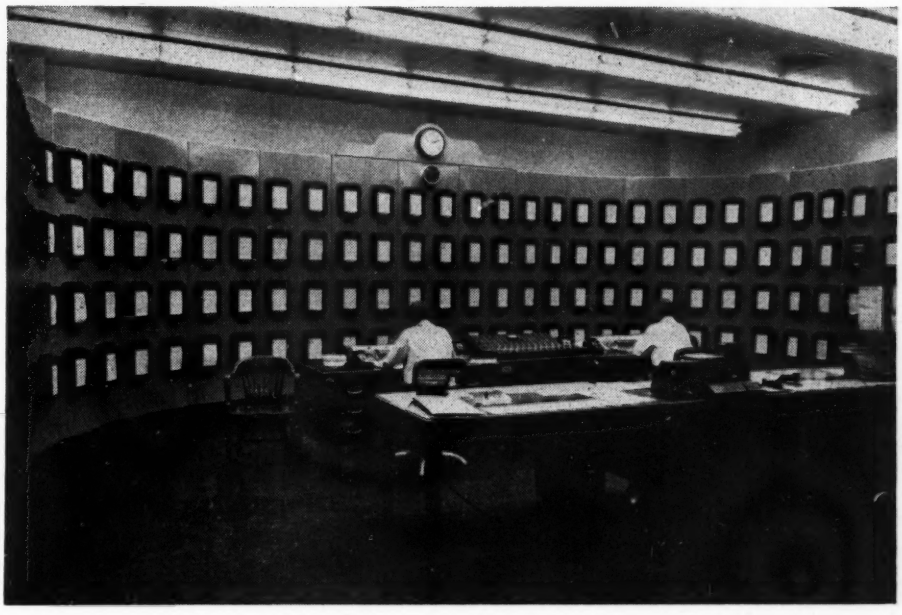


This control panel is the nerve center of Memphis Gas' dispatching and telemetering operations that guard against changes in pressure. Any pressure variation in the system is indicated immediately on the panel and the condition can be rectified in a matter of seconds by pressing a switch. Fig. 1.

Dispatching and Telemetering In a Distribution System

By STEPHEN J. STEGER
Memphis Light, Gas & Water Division
Memphis, Tenn.

IN 1944, it was found that Memphis' distribution system had expanded and gas demand had increased to such an extent that existing methods of pressure control were inadequate. Because of this a 24-hour gas dispatching department was set up.

Exclusive

Prior to this time pressure control had been maintained by regulator crews under the supervision of the gas distribution department and had consisted primarily of time and temperature controllers on a few of the district regulators and manual boosting, or reducing, of pressures on the rest of the regulators. No criticism of this method is intended as it proved satisfactory for a time.

As the system grew and gas demand increased, however, there was also a sharp increase in customer complaints because of pressure variations. These repeated service calls burdened the gas service department with additional operating expense, and also were a source of irritation to our customers.

Since there was no continuous record of pressures throughout the system considerable delay was experienced in discovering that a low pressure condition existed in the system. Often the condition was not discovered until a serviceman answered a call on an inoperative appliance and found the call was owing to low pressure in the area. This almost inevitably led to additional customer complaints from the area and meant additional work for the servicemen and inconvenience to the customers.

The opposite condition, high pressure, often occurred as a result of unexpected or sudden rises in temperature. (Incidentally, accurate weather forecasting is especially difficult owing to Memphis' geographical location and the geophysical characteristics of the surrounding territory.) In these instances it was impossible at times for the regulator crews to make manual adjustments soon enough to avoid pressure complaints. This unnecessary high pressure, of course, also resulted in excessive leakage loss. Constant adjustments were necessary both in system pressure and in pressure to customers' appliances. Since most of these adjustments had to be made manually, very often the undesirable condition would exist before the remedy could be applied, and, of course, this had its effect upon customer relations.

The establishment of the gas dispatching department was the first in a series of improvements designed to correct and, if possible, eliminate these undesirable conditions. The department was entrusted, as it should be, with the responsibility of operating the distribution system and accumulating permanent records of these operations. Responsibilities of this department consist chiefly of the following:

1. Control of operation of all valves and regulators in the system, or in other words, absolute control of the amount and direction of flow of gas in the whole system at all times.
2. Calculation of expected load demand 36 hours in advance by checking weather conditions in and around the area and comparing them with a record of similar conditions previously encountered. These weather conditions are constantly checked by teletype.
3. Hourly posting of pressures, deliveries, and demand conditions for a permanent record. From this is prepared a condensed daily report for distribution among division officials and supervisors.
4. Maintaining a daily log sheet on which all deviations from normal operating procedures and conditions are entered. These are carried forward from day to day until the condition is corrected or returned to normal.
5. Control of operation of the manufactured gas or propane gas plants; the determination of when, and how long, these

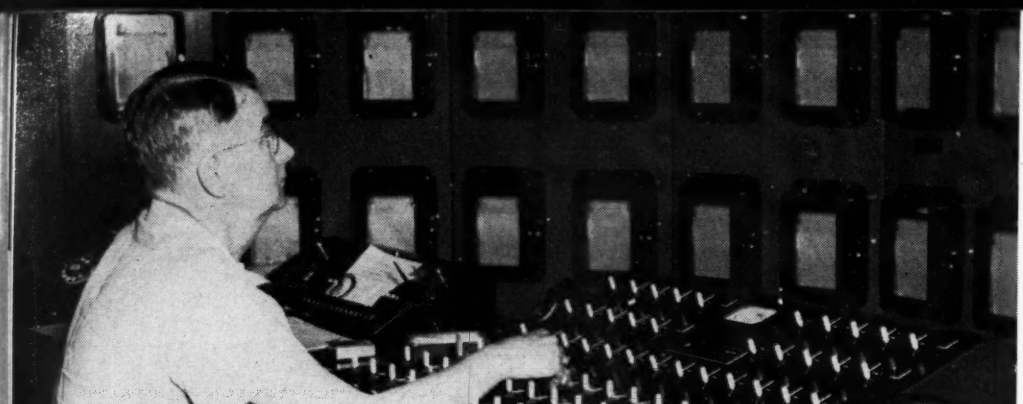


Fig. 2. Regulator control console. Each toggle switch controls the outlet pressure on some regulator in the system.

plants are to be in operation, and the amount of manufactured or propane gas to be added to the natural.

6. Issuance of clearance orders to construction and maintenance crews for all work that affects the flow of gas in the mains or to the customers.

7. Notification of consumers when conditions indicate that there may be a necessity for curtailment of delivery to these consumers, and decision as to the time and amount of curtailment necessary.

Some of these duties are carried out by the use of two-way radio which furnishes a means of constant contact with all regulator, construction, and maintenance crews, as well as the supervisors of the departments whose automobiles are also radio-equipped.

Fewer Complaints

Soon after the department started to function there was a noticeable decrease in service calls and customer complaints. This led to the conclusion that even closer pressure checking, recording, and control would, in turn, lead to less leakage loss and fewer pressure complaints. It was then that the idea of large scale telemetering and remote control was advanced.

Since the electric division of our company already had in service a large amount of private telephone cable and easily accessible electric power, it was felt that telemetering and remote control could be economically adapted to the gas distribution system, as the expense of renting or leasing these items would be eliminated or greatly reduced. In this respect, we realize that we enjoyed a distinct advantage over independently operated gas companies, in that installation and maintenance of the electrical phases of our telemetering and remote control system could be taken care of by forces already operating within the organization.

Another deciding factor was the belief that decreased leakage loss and the intangible asset of improved customer relations and service would justify the expenditure. We expected to accomplish our objective through "check point" telemetering that would indicate pressure variations in an area and by remote control of regulators that would rectify the condition in a matter of seconds instead of the unpredictable length of time needed in the past to locate and correct a condition manually.

Telemetering is the constant recording, at one location, of pressure or conditions existing in another location or locations, while remote control is merely what the term implies, the boosting or reducing from one location of the outlet pressure on regulators installed at another location or locations. The time saving is apparent.

In our terminology "check point" designates a location in some given area at which pressure variations affecting the customer would first become apparent, and "remote control point" designates a regulator on which the outlet pressure can be changed remotely.

All recording, receiving, or indicating instruments are located on a panel in the gas dispatching department (see *Fig. 1*). These include, in addition to pressure recorders, an atmospheric temperature recorder, barometric pressure recorder, wind directional indicator and velocity recorder, and dew-point recorder as well as the teletype previously mentioned and a recorder showing the height of the 3 MMcf emergency holder located at the gas plant approximately three miles away. Also located in the department is a two-way radio, a lighted wall map (*Fig. 5*) showing the principal mains in the system and the location and status of valves and regulators.

Fig. 2 shows the regulator control console being operated by one of the dispatchers on duty. Each toggle switch on this console controls the outlet pressure on some regulator in the system. These switches and their companion controllers located at some distant point are so calibrated that by pressing the key to the upper position the proper impulse is transmitted to a small reversible motor in the controller that causes the outlet pressure on the regulator to rise at the rate of 1% of the controllers range per second. Depressing the switch to the lower position accomplishes the opposite at the same rate. This is done by means of either a positive or negative impulse of low-voltage direct current terminating on a polarized relay that draws the armature to one side or the other and operates the reversible a-c motor in the desired direction.

Check Points

Each check point consists of a pressure transmitter connected to its companion receiving recorder in the dispatching department and a direct telephone to the dispatcher.

Each remote control point consists of inlet and outlet pressure transmitters, controller, and telephone. A front and back view of one of these installations is shown in *Figs. 3* and *4*. *Fig. 6* shows a remotely controlled regulator.

Fig. 1 pictures the dispatching department as it is at present, showing all but a few of the receiving instruments, most of which are now in operation. This room drew numerous favorable comments from members of the gas industry who visited us during the AGA conference held in Memphis during 1951.

Since the installation of around-the-clock finger tip control, the service department has been relieved of a disagreeable and very costly portion of its operation. Now almost all of the serviceman's time can be channeled, as it should be, into the service of customers' appli-

ances. Pressure troubles in mainline distribution have ceased to be a concern of the serviceman. His manometer, which he used to carry into almost every home, is rarely removed from its case. No more is it necessary for him to adjust an appliance on some cold day to operate on a low pressure and two or three days later readjust it to operate on a much higher pressure. The number of calls worked by the servicemen has been considerably reduced in the winter months since pressure variations have been eliminated. The serviceman's job has been made easier and as a result he has become more congenial and happier in his work.

The service department has noticed, perhaps more than any other group or department, the betterment of customer relations. Now that pressure is no problem in the operation of appliances, the servicemen can render our customers a real service in correcting the trouble with an appliance on a single call and therefore uphold the high regard that our customers have come to have for our servicemen's knowledge and skill.

The regulator crews can now devote most of their time to proper maintenance of equipment and operation of regulators which have not yet been equipped for remote control.

This was accomplished in spite of the tremendous expansion in the distribution system. In 1944, the system had 1167 miles of main (3-in. equivalent) with 59,914 customers and a maximum daily demand of 106,500 Mcf. In 1951, the system had expanded to 1811 miles of main (3-in. equivalent) with 108,402 customers and a maximum daily demand of 242,271 Mcf.

We also feel that the dispatching department, with the information it obtains daily, has been of vital assistance to our engineering department in locating areas that are in need of improvement, either through the installation of new or larger mains, or new or resized district regulators, and in the formulation of long range plans for future growth. Only recently the dispatching department was able, on short notice, to furnish the management information in regard to demand, peak loads, degree days and other data urgently needed for presentation before the FPC. We feel that the inauguration of the dispatching department and the installation of telemetering and remote control was a necessary and wise move and that the benefits and profits derived, both tangible and intangible, have more than justified the expenditure.

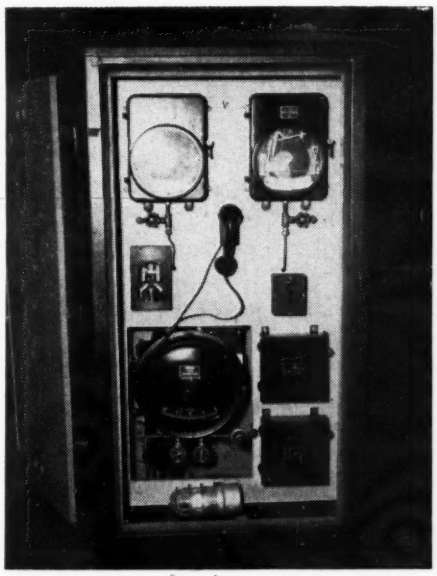


Fig. 3. Front view of a remote control point showing transmitters, controller, and telephone.

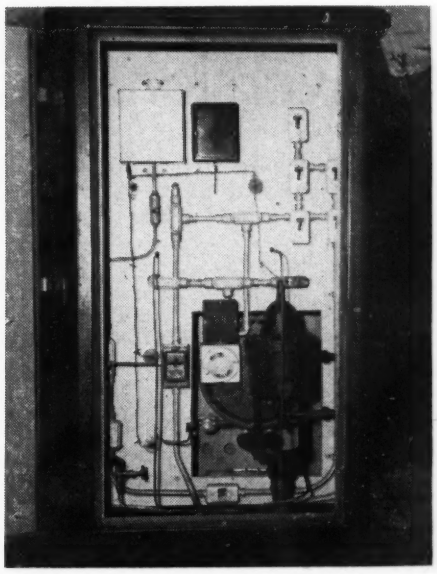


Fig. 4. Rear panel view of the remote control point.

Fig. 5. This lighted wall map shows the principal mains in the system and the location and status of valves and regulators.

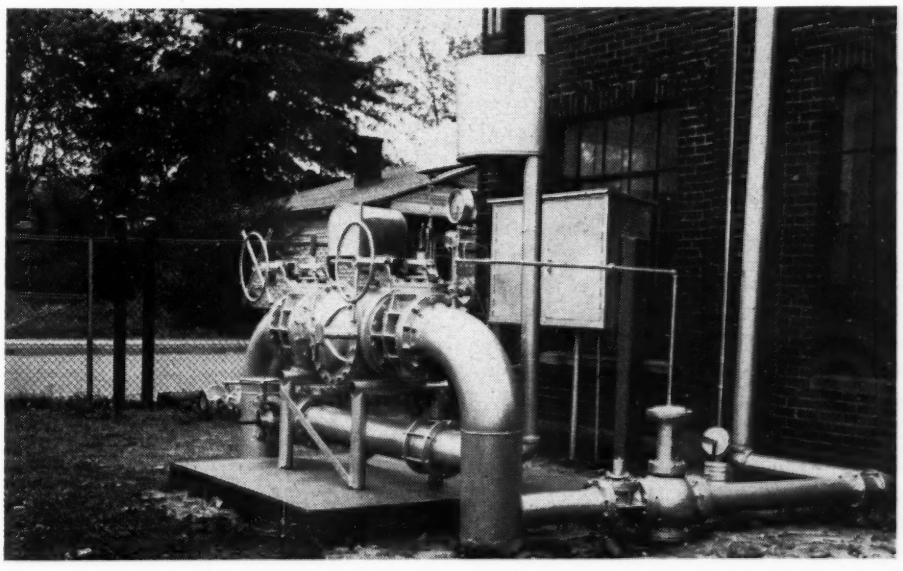


Fig. 6. A remotely controlled regulator.

Conversion of Greenpoint To a High-Btu Gas Plant

By W. E. TATE
Brooklyn Union Gas Co.
Brookyln, N. Y.

THE conversion of the territory of the Brooklyn Union Gas Co., which supplies 853,000 customers in Brooklyn and Queens from 537-Btu manufactured gas to 1040-Btu natural gas has recently been completed. Many phases of the work have received considerable publicity and have caught the eye of the public. Other phases which have had little publicity are equally important to the success of the over-all conversion program.

Exclusive

One of these latter phases is the alteration of apparatus in the plants that formerly made 537-Btu gas to equipment designed for the production of high Btu gas, which will be capable of replacing or supplementing the natural gas should its supply fail or be insufficient for demands.*

Brooklyn Union operates two plants: Greenpoint Works, which was capable of producing 161 MMcf of 537-Btu gas daily, and Citizens Works, with a rated capacity of 52 MMcf per day of 537-Btu gas.

Greenpoint Works, one of the largest utility gas plants in the world, was producing the 537-Btu gas from a number of sources, and consequently had great flexibility of operation. The sources were the generator house, the coke oven batteries, the producer gas plant, an adjacent refinery plant, and an L.P. tank farm.

The generator house contained 11 three-shell carbureted water gas sets equipped for heavy oil operation. Five of these were modern large mechanical grate sets, each with a daily capacity of 10 MMcf of 537-Btu gas. The other six were manually cleaned sets, each capable of producing 6⅔ MMcf per day of the 537-Btu gas. Ninety coke ovens in the coke oven plant produced an average of 23 MMcf per day of 560-Btu gas.

The primary purpose of the producer gas plant was to make 130-Btu gas for underfiring the coke ovens, but, when required, excess amounts of it up to 16 MMcf per day could be produced for sendout gas.

Facilities were available to use refinery gas of 1800 Btu from a nearby Socony-Vacuum refinery, and up to 2.4 MMcf per day could be reformed in the carbureted water gas sets or used as cold enrichment in sendout gas.

The L.P. tank farm contained 28 tanks of 30,000-gal. capacity. Propane, butane or iso-butane stored in them could be used for cold enrichment of sendout gas or could be put through jet compressors to aspirate air and produce an L.P. gas-air mixture of 537 Btu.

Although various combinations of the gases mentioned above were used to meet sendout demands, plant capacity of 537-Btu gas was rated as follows:

1. Carbureted water gas	90 MMcf
2. Coke oven gas	23 MMcf
3. Refinery gas-prod. gas	10 MMcf
4. L.P. gas-prod. gas	10 MMcf
5. L.P. gas-air mixture	28 MMcf
Total	161 MMcf

When natural gas arrived in Brooklyn in January 1951, facilities to reform it in the carbureted water gas sets were installed, and as a result the capacity of each set was increased about 60%.

In the plant changes for the production of high Btu gas, the coke oven plant and the producer gas plant have been shut down and are being dismantled. The five mechanical grate carbureted water gas sets are being converted to bottom burner oil gas sets and the six manually cleaned sets are being converted to Hall four-shell oil gas sets. Four jet compressors, formerly used on the natural gas coke oven underfiring system, will be installed at the outlet of the meter house. They will be activated by natural gas to add air whenever refinery gas is used, to produce a refinery gas-air mixture of 1040 Btu. The apparatus for handling L.P. gas will not be changed but the amount of aspirated air will be reduced so that a 1040-Btu L.P. gas-air mixture results.

Plant capacity of 1040-Btu gas is estimated as follows:

1. Bottom burner oil gas sets	37 MMcf/day
2. Hall 4-shell oil gas sets	30 MMcf/day
3. Refinery gas-air mixture	4 MMcf/day
4. L.P. gas-air mixture	14 MMcf/day
Total	85 MMcf/day

The alterations of the five mechanical grate carbureted water gas sets to convert them to bottom burner oil gas sets are relatively simple. No changes are required on the superheaters, and the installation of a make oil spray is all that is required on each carburetor. The greatest changes are required on the generators and these include the replacement of water cooled walls by brick lining, the elimination of all coke charging and ash removal apparatus, and the installation of make oil sprays at the top and heat oil sprays with primary air connections at the bottom of the shells. The backrun lines are blanked off and the 3-way Chrisman valves at the inlet of the washboxes are locked in position so that only upruns can be made (see *Fig 1*). The sets are designed for use of low carbon content oil for make oil but can use heavy oil or tar for heat oil.

In the original construction of the six, three-shell manually cleaned carbureted water gas sets, an unusually large dust collector was installed between each generator and carburetor. This dust collector whose diameter was the same as the carburetor, provided the nucleus for the fourth shell required in the adopted Hall oil gas process. This process makes gas from two shells of a four-shell unit for one cycle, then alternates and makes gas from the other two shells during the second cycle. While gas is being made in one set of shells, heat is regenerated and carbon is scurfed from the second set of shells. Because of this, high carbon content heavy oils can be utilized for gas making in this process, with the attendant economies. The four shells consist of two generators, each equipped with heat and make oil sprays, and two fixing chambers. The generators contain limited amounts of checkerbrick, whereas the fixing chambers are filled with checkerbrick.

In the alteration of each of the six manually cleaned carbureted water gas sets to Hall oil gas sets, the old generator becomes #1 fixing chamber; the dust collector, #1 generator; the old carburetor, #2 generator; and the old superheater, #2 fixing chamber. As indicated in the accompanying sketches, *Fig. 2*, major alterations are required to convert the old generator and dust collector,

*For further information see "How Natural Gas Is Used at Greenpoint Works" by Michael Anuskiewicz Jr., *GAS*, Sept. 1951.

minor ones to convert the old carburetor, and no changes are required on the superheater.

The grates are removed from the old generator and are replaced by arches that support a full chamber of checkerbrick. All cleaning doors are removed and their openings are blanked. A stack with stack valve, plus a connection to the washbox, is installed at the top of the shell where the charging hole door was formerly located.

Each dust collector in the original installation was equipped with a cone hopper bottom. In the alteration, this section is removed and replaced by a cylindrical extension of the upper shell. Arches are installed at the base which support limited amounts of checkerbrick.

The gas connection between the new generators extends from the top of the shells. The gas connections between the generators and the fixing chambers are located at the bottom sides of the shells. Combination heat and make oil sprays extend down from the top into the generators. Connections are installed to use heavy oil or tar for heat oil and heavy oil for make oil. The air blast connections are located at the top of all shells and the steam connections are attached to the blast lines at the top of the fixing chambers.

In addition to the present 2 million-gal. oil storage capacity, two tanks are being constructed that will increase this capacity to 6 million gals. The condensing equipment and the tar dehydration apparatus are considered adequate and no plans for expansion are being considered at the present time.

The five light oil scrubbers which have been operated at oil rates of 600 gals. per MMcf for carbureted water gas operation are being redesigned to utilize oil rates of 1500 gals. per MMcf. When the coke oven plant was shut down it was purged to the inlet of its two light oil scrubbers. These and the apparatus beyond them are still under gas pressure. A connection will be installed between the inlet header of the five water gas scrubbers and the inlet of the two coke oven scrubbers, so that the latter two may be used in addition to the five for peak load operation.

The conditioning of the scrubbing oil and the extraction of salable light oils will be handled in the existing light oil plant that formerly served both water gas and coke oven plants. Some alterations and additions to apparatus will undoubtedly be required here, since the quantities and composition of the light oil from oil gas operations differ from that handled previously. These changes will be made as experience dictates.

In the past, four, three-box series of purification boxes were used for removal of sulfur in water gas operations, and three, four-box series for coke oven gas operations. Since the latter are available, all 24 boxes will be used in the oil gas operations.

In order to avoid any unnecessary variations in the proportions of oil gas to natural gas in sendout, existing mixing equipment which was formerly used to enrich manufactured gas with natural gas, will be modified to mix oil gas with natural gas.

The conversion of consumers' appliances for use of natural gas started in March and was completed in August. Alterations of equipment at Greenpoint Works had to keep pace with the conversion program, so that the plant at all times would be able to make any required quantities of both 537 Btu and 1040 Btu gas. To date, the work on three bottom burner and one Hall oil gas set has been finished, while alterations to six other machines are in various stages of completion. Preliminary test runs have been made on those completed and the results have indicated that satisfactory operation can be obtained.

This article has dealt primarily with the changes at Greenpoint Works. At Citizens Works six, three-shell carbureted water gas manually cleaned sets are being altered; five to bottom burner sets and one to a twin generator set. A new 1 million-gal. oil tank and other necessary accessory apparatus are being installed. Capacity of this plant is estimated to be 34 MMcf per day of 1040-Btu gas.

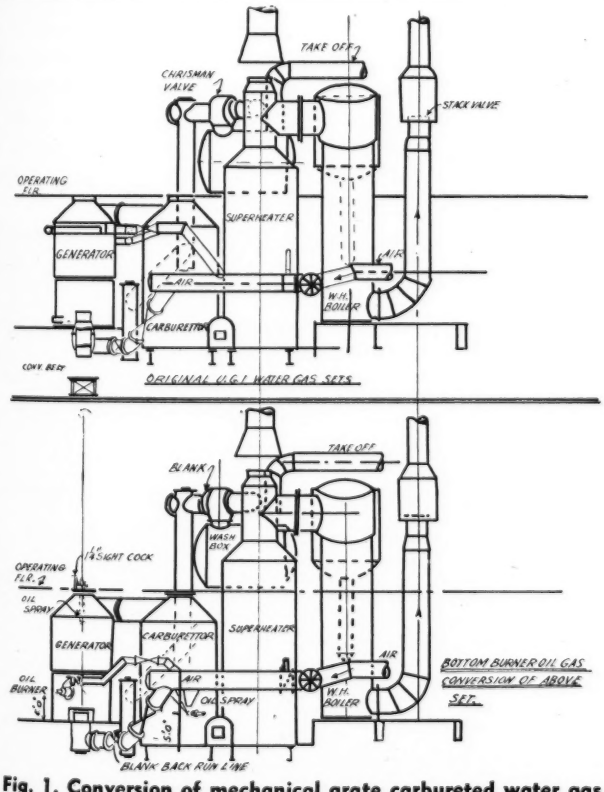


Fig. 1. Conversion of mechanical grate carbureted water gas sets to bottom burner oil gas sets.

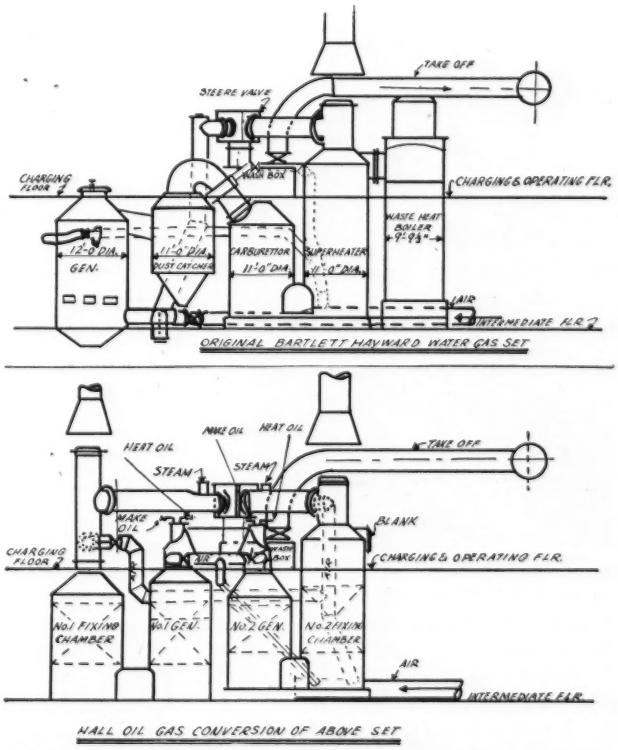
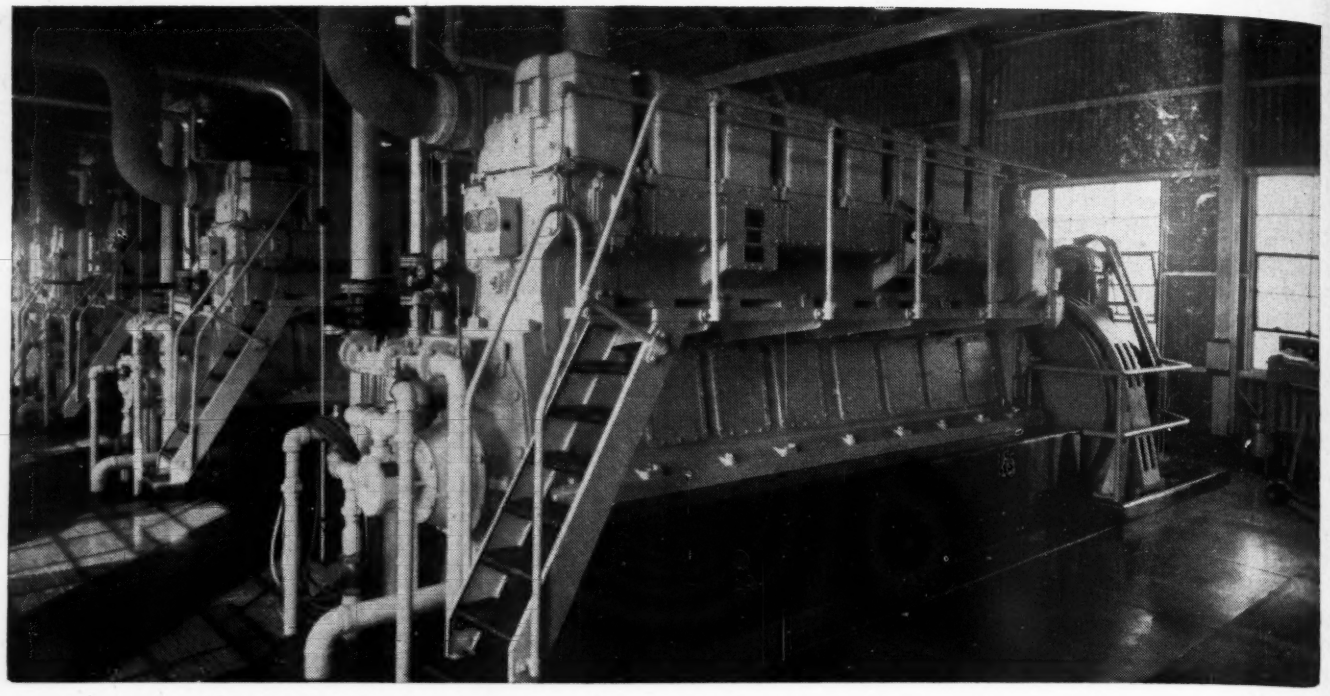


Fig. 2. Conversions of manually cleaned water gas sets to Hall oil gas sets.



At Seeligson, Texas, Magnolia Petroleum has five JS gas engines to furnish the necessary electricity, one of the many examples of economic power generation by gas engines.

Is Gas-Engine Power Generation Economical?

By R. F. LAY
The Cooper-Bessemer Corp.
Mount Vernon, Ohio

Mr. Lay, at present installation engineer in charge of the stationary installation department at Cooper-Bessemer, formerly served as a sales engineer with Baldwin Locomotive Works, and was chief supercharger engineer and production manager of the Elliott Co.

Exclusive

GAS engines on the market in the early 1900's were low horsepower units by today's standards and were largely used in the oil and gas field areas. Larger units were developed subsequently for gas transmission line service and the progressively growing areas served with natural gas broadened the field for gas engines in a number of power uses, including that of electric power generation.

The appearance of the gas engine as an important factor in electric power generation, however, probably occurred in the 1940's, as units of greater efficiency and still larger size were developed.

Recent developments in gas engine output and efficiency make a study of the economics of power generation by gas engines worthwhile at this time. This is particularly true as the costs of coal and oil fuels continue to increase for this purpose. The growing records of gas engine generated power costs provide a sound basis for predicting costs of such power in further applications.

Such a study can benefit the people who generate electric power and those who produce, transport, and market gas, as all are interested parties. We find that some who have decisions to make on sources and means of electric power supply do not have current information available, or do not fully appreciate the

TABLE 1. Variations in Fuel Economy of Gas-Burning Engines

	Air Induction	Cycles	Compression	Ignition and Type	BMEP	Btu/kwh	Thermal Efficiency
1.	Supercharged	4	high	gas-diesel	135	9,130	39.2
2.	Supercharged	4	high	spark	135	9,440	37.9
3.	Atmospheric	4	high	gas-diesel	90	9,880	36.8
4.	Atmospheric	4	high	spark	90	10,120	35.9
5.	Atmospheric	2	high	spark	67.4	12,200	30.0
6.	Supercharged	2	high	spark	82.8	12,250	29.7
7.	Atmospheric	4	low	spark	70	13,550	26.9
8.	Atmospheric	2	low	spark	61.3	14,550	25.1

present possibilities of low cost power generation by modern, progressively developed gas engines.

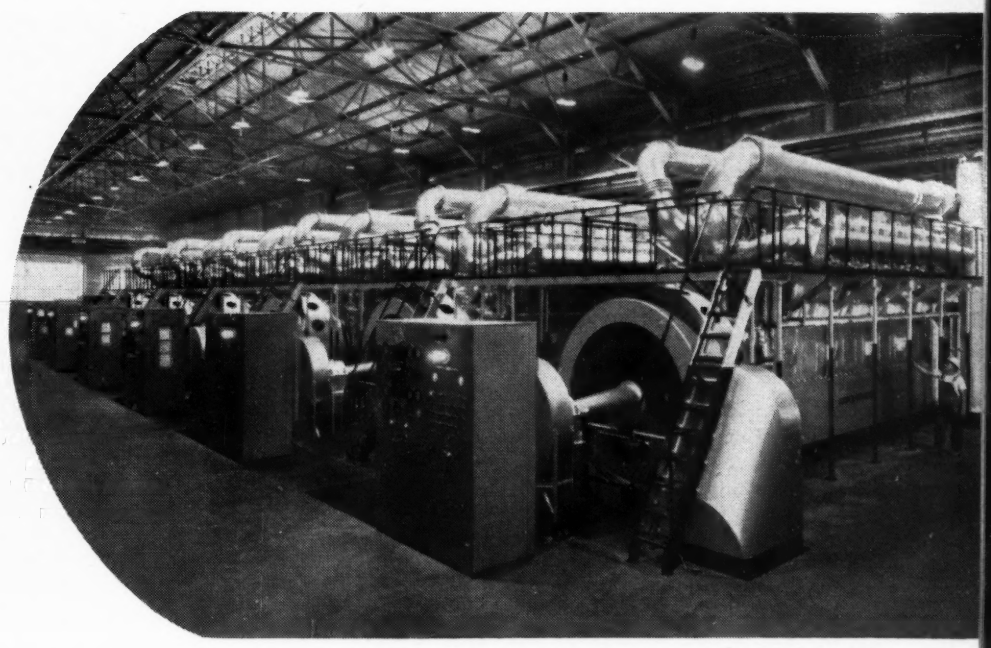
Continued development in the efficiency, dependability, and cost reduction of gas engines has been accomplished and must continue to better serve engine users and so that we may remain competitive in a field where continued development in steam and gas turbines and electrical equipment has and will spur us on. This progress in all lines is made possible by progressive advances in metallurgy and design.

Conditions Vary

Judging from past experience, there is probably a place for each type of power generating equipment, as conditions that dictate a choice are subject to variation.

We find that the size of individual units offered by a number of gas engine builders has increased in the past several years. We can report that we are now obtaining 70% more power from a cu ft of gas, and 93% more power from the same cylinder size and engine speed, comparing current four-cycle gas engines to those we produced six or more years ago. Larger engines and improved efficiency have greatly widened the field and increased the size of plants in which gas engine-generator units offer sound economic advantages.

Figures on the engine industry as a whole are not at hand but our own orders for gas engines for power generation for the years of 1948, 1949, and 1950 have averaged more than twice those received in 1947. This is an indication of the growth of gas engine application in this field.



View of the six type LSV supercharged gas engines in the AC generating plant of Reynolds Metal Co.'s San Patricio plant, Corpus Christi.

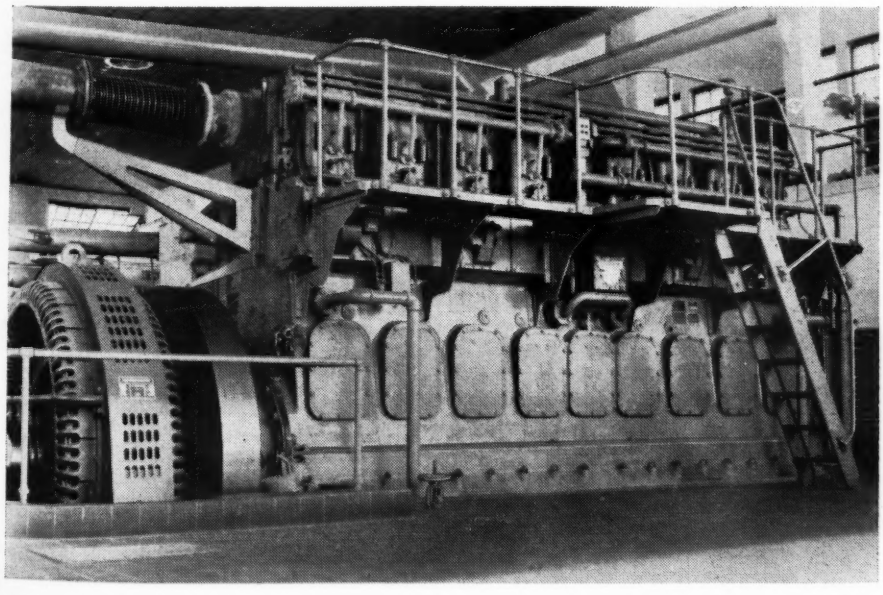
The possibilities of the size of plants can be seen in Texas, where the Aluminum Co. of America has a gas engine-generator installation in operation now totalling about 133,000 kw. It is understood that this installation is being expanded considerably. Several other large gas engine-generator installations are under way now, among the largest of which is a plant containing about 190,000 kw, in which our company will furnish the major part of the power generating equipment.

Economic Limit

Prior to recent gas engine developments, the Rural Electrification Administration considered engine generating plants economically sound only up to 10,000 kw total capacity. This ceiling has now been raised greatly as compared to the ceilings of other prime movers owing to improved efficiency, the availability of larger units, and total costs.

On the other hand, small units are also on the market and we have information on power costs on 30-kw units that are proving attractive to the owner.

A Type LS-8 gas engine driving a Westinghouse generator in the municipal power plant at Robstown, Texas.



Four Types

Gas engines can be generally divided into two- and four-cycle types, each of which can be sub-divided into low compression or high compression models. The high compression engines are further sub-divided according to means of fuel and air mixture ignition into spark-ignition or pilot oil flame ignition (gas-diesel) type, and into supercharged or atmospheric pressure air induction types.

These variations present the picture shown in *Table 1* for gas-burning engines at full rated load, in the order of fuel economy.

This tabulation shows, in general, the more economical, higher capacity types of recently developed engines at the top of the list, with the older, less economical, lower capacity types at the bottom.

We have built all of the above engines, and have both two- and four-cycle models in power generation plants. In general, we recommend the four-cycle engines for generator drive for smooth parallel operation over a wide range of loads. The types of engines offered by the various manufacturers for gas engine-

generator service will largely depend on the types of equipment they have developed and have available.

Best Selection

The best selection from among these types may not depend entirely on fuel economy. Consideration of load range, parallel operation, capital investment, limitation of payout period, and period of fuel availability, may apply. Use of gas-diesels may be most practical or economical in some instances where dependable operation may be assured by provision of oil as a standby fuel for the usually more economical gas fuel. This safeguards against gas supply interruptions, or may permit adoption of gas as a major fuel at dump rates during some periods.

Further options on the most economical or dependable operation are provided on these four-cycle units by designs that permit operation as a straight gas engine, gas-diesel, or full diesel engine. The engine can be factory built as either a gas or gas-diesel engine, or can be converted from one to the other in the field in several hours. The field switch from gas-diesel to full diesel operation is accomplished automatically, should the gas supply be shut off while the unit maintains its load.

Power Costs

In order to gain some feeling of the possible cost of gas engine power generation, let us examine an analysis of power costs of three sizes of generating plants (see *Table 2*). Such an analysis must be based on a number of assumptions, most of which can be somewhat controversial but which may provide either a basis or outline for anyone to make a more detailed study, by substituting either his own data or his own assumptions. We will present data to indicate actual costs for comparison with some of these assumptions.

As a basis, let us assume that:

1. Equipment and buildings involved will provide a simple, adaptable, commercial installation, providing 2400, or 4160 v, 3-phase, 60-cycle outgoing power.
2. The engines will be high compression, straight gas engines, four-cycle, with atmospheric air induction in the small plant and supercharged air supply in the larger plants.
3. Operating personnel will consist of one superintendent, plus four operators and two maintenance and utility men for the three-unit plant, or eight operators and three utility men for the four-unit plant.
4. Fuel gas of 1000-Btu/cf low heat value will be available at a total commodity and demand rate of 20 cents per Mcf.
5. Lubricating oil will be available at a rate of 50 cents per gal.
6. Engine lubricating oil usage to be at a rate of 5000 rated hp hours per gal.
7. Depreciation rate to be based on writing the plant off in 20 years, or 5% per year.
8. Interest on investment to be charged at a rate of 2%.
9. Taxes to be charged at an average rate of 1.5%.
10. One engine-generator unit will be available as standby.
11. Unit loading to be based at 90%, on an operating schedule of 8760 hours per year.
12. Unit repair costs to be based at $6 per kw year of firm capacity for mechanical and electrical repairs, and maintenance labor and material.

The analysis in *Table 2* has intentionally been made conservative, in order to provide a sound basis for discussion. We believe, however, that the costs of power generation as indicated by these figures can be so definitely attractive that it can encourage power users to take stock of

TABLE 2. Analysis of Power Costs of Three Sizes of Generating Plants

Plant	A		B		C	
General						
Number of units	3		3		4	
Gross kw/unit	600		1,305		2,630	
Total Gross kw	1,800		3,915		10,520	
Net kw/unit	586		1,282		2,535	
Total Net kw	1,758		3,846		10,140	
Firm Net kw	1,172		2,564		7,605	
Estimated Total Plant Cost:						
/gross kw;	$250		$200		$175	
for plant	$450,000		$783,000		$1,841,000	
Annual Net kwh	9,280,000		20,190,000		59,750,000	
CF gas/net kwh	10.68		9.69		9.84	
Annual Mcf gas	99,100		195,500		588,000	
Annual rated hp hrs	15,150,000		32,400,000		97,200,000	
Annual lube oil, gals	3,030		6,480		19,450	
Operating Cost Per Year						
	Total	**kwh**	**Total**	**kwh**	**Total**	**kwh**
Superv. and labor	$24,200	$.00260	$24,200	$.00123	$ 41,400	$.00069
Gas fuel	19,820	.00213	39,100	.00200	117,600	.00197
Lube oil	1,515	.00017	3,240	.00017	9,725	.00017
Maint. and repair	7,200	.00078	15,650	.00080	47,350	.00080
Total	$52,735	$.00568	$82,190	$.00420	$217,075	$.00363
Fixed Charges Per Year						
Depreciation	$22,500	$.00243	$39,150	$.00194	$ 92,000	$.00154
Interest	9,000	.0097	15,650	.00077	36,850	.00062
Taxes	6,750	.00072	11,750	.00058	27,650	.00046
Total	$38,250	$.00412	$66,550	$.00329	$156,500	$.00262
Summary of Net Total Cost kwh, Basis Annual Costs						
Operating costs	$.00568		$.00420		$.00363	
Fixed charges	.00412		.00329		.00262	
Total	$.00980		$.00749		$.00625	

1.	Plant
2.	Engines
3.	Cycles and kw
4.	Type, see Table1
5.	Engine fuel
6.	Cost—gas/Mcf
7.	Cost—pilot oil/gal
8.	Unit load factor
9.	Annual kwh
10.	Cf gas/kwh
11.	Gals. oil/kwh
12.	Annual Mcf gas
13.	Lube oil-hp hrs./gal
14.	**Operating Costs/kwh**
15.	Superv. and labor
16.	Gas fuel
17.	Oil fuel
18.	Lube oil
19.	Maint. and repair
20.	Total
21.	**Fixed Charges/kwh**
22.	Depreciation
23.	Interest
24.	Taxes
25.	Total
26.	Total oper. and fix. ch./kwh
27.	Comments

their own situation. Similar calculations, using their cost information will develop their own picture.

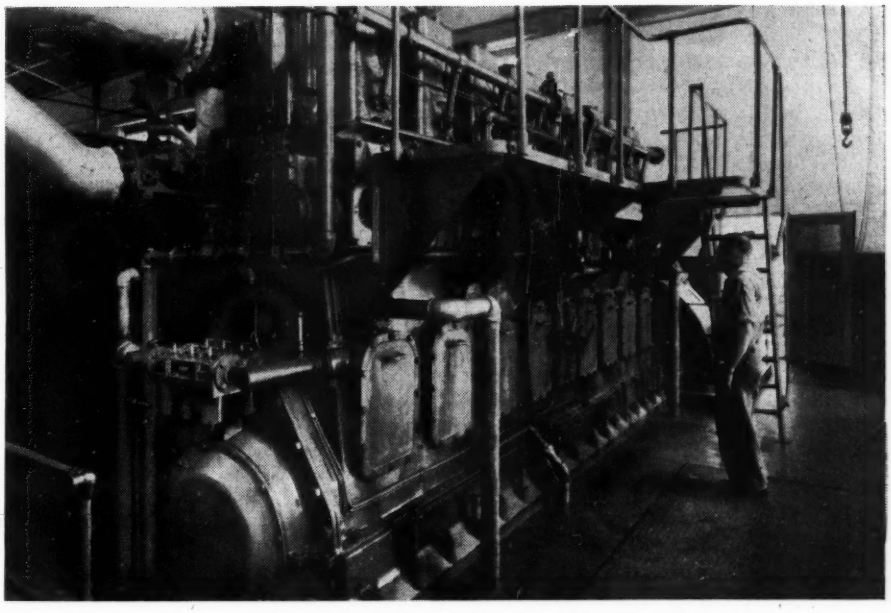
It is difficult to obtain complete actual plant operating cost data to compare directly with such an analysis, but we are fortunate in having obtained cost data on a considerable range of sizes and applications of gas and gas-diesel engines for power generation. See *Table 3*.

From the actual cost data, it is clear that gas engine-generator plant operators are, in general, doing better than the calculated costs on the three plants set up for analysis.

Operating Costs

Operating costs of the order shown will make it possible to understand the attitude of the operator of one plant, in which our latest type of gas engine-generator units are installed (such as shown in *Table 1*). He is quite reluctant to accept a supply of hydro plant power at .0046 cents/kwh, as he feels he can generate power in his plant at a lower net cost.

In addition to the attractive feature of low cost power generation made possible by recent developments in gas engines, the increased efficiency results in conservation of gas, a valuable natural resource. This becomes an important factor owing to the increasing use of gas engines, and particularly in view of the very considerable amount of gas engine-generator units installed and being installed in aluminum reduction plants for defense and commercial needs.



Operating side of an LS-8 gas-diesel engine.

The difference in efficiency between a modern gas engine-generator unit having a fuel consumption of 10 cu ft of gas per kwh, and earlier equipment having a fuel consumption of 13 cu ft of gas per kwh, can mean a possible saving of 12.5 MMcf of gas a day and more, in any one of the aluminum reduction plants. This is enough to supply the needs of some communities for a year.

Among the major users of gas engine-generator equipment are the oil and gas field, processing, and pipeline companies, public utilities, municipalities, REA generating cooperatives, industrial concerns, and aluminum reduction plants.

The growing application of gas engine-generating equipment in these services is a real indication of the thought given to economic factors in power generation, and the result of such studies in a number of fields. It is interesting to note that gas engine-generator equipment is being used in the same fields by competitive power producers.

E 3. Cost Data on Several Sizes and Applications of Gas and Gas-Diesel Engines for Power Generation

	2	3	4	5	6	7	8	9	10	11	12
Springs REA Coop. Ariz.	Gasoline Plant	Big Lake Oil Co.	Public Utility	Pipe Line Auxiliary	Pipe Line Auxiliary	Field Station	Field Station	Texas Municipal	Texas Municipal	Texas Municipal	Gas Company Shop
Bess.	2	6-Coop. Bess.	Coop. Bess.	Total-	3-4		5-Coop. Bess.	1-Coop. Bess.	2	2	1
	4-125	4-400	4-700	4-1500	4-50	1500	4-500	4-1000	2-Av. 1835	2-2500	4-30
2	Hi speed-Atm.	Group 7	Group 1	Group 4		Group 4	Group 7	Group 4			Group 7
	Gas	Gas	Gas-Diesel	Gas	Gas	Gas	Gas	Gas-Diesel	Gas-Diesel	Gas-Diesel	Gas
	$.06	Not Incl.	$.165	$.055	$.055	$.04-.05	$.06	$.144	$.128	$.14	
			$.114					$.095	$.10	$.08	
100%	76.5%	71%		40%	50%		79%		56.7%	60%	
	1,325,600	12,374,700	573,350				13,760,000	3,939,900	18,000,000	23,000,000	183,000
	11.6	14.3	11.8				14.5				22
			.0045								
	15,320	176,617	6,741				200,000	43,750	189,000	224,268	4,020
w.	4850										2,400
	$.00054	$.00135		Incl.	Incl.	Incl.	$.00145		$.00167	$.00091	Incl.
	.00069	Not Incl.	$.00245	Incl.	Incl.	Incl.	.00087	$.0016	.00132	.00136	$.0064
			Incl.						.00041	.00042	
	.00025			Incl.	Incl.	Incl.	Incl.		.00030	.00022	.00068
	.00075	.00091		Incl.	Incl.	Incl.	.00085	.00013	.00022	.000278	.00025
$.0028	$.00223	$0.002264		$.006	$.009	$.0035-$.004	$.00317	$.00173	$.00392	$.003188	$.00733
											$.0029
	$.00277										
	$.005										

rry up to 28% overload regularly.

Let's Get Rid of the Unreasonable Customer

By G. S. COATES
Southern Counties Gas Co.
Los Angeles

FIRST of all, I'd like to ask a question that's very basic to all of us. The question is this: *"Are customers unreasonable?"*

At the end of a long, hard day I think most of us here would like to answer, "They certainly are!" In a few cases, of course, we'd be right—but all too many times we'd be wrong—very wrong indeed! It all depends on the point of view; so let's look into a few of the typical things we do and see just how unreasonable our customers may be. Let's look at them from the other side of the fence.

For example, a solid citizen from the Middle West sells his business for a million bucks and comes west to retire. He picks one of our delightful towns as just his dish, he puts a fat slice of his bankroll in the local bank, he rents a charming apartment. In the midst of moving he thinks of the beauties of fine gas service. He phones the gas company to come out and turn on the meter . . . so what happens?

Authoritative Voice

An authoritative voice quietly but firmly tells him: (1) He'll have to come into the office to make written application for service; (2) he'll have to put up a deposit because he hadn't previously resided in the state.

This fellow "blows his top"! He insists he is busy moving, and there is no reason at all for coming down to the office. He says he wants the gas turned on, he expects to pay the bills, and, furthermore, he doesn't have to put up a deposit! If we don't think his credit is any good, just check with the bank!

He is told, still very politely but firmly, that the company isn't picking on him or discriminating against him, but that we just have to protect ourselves; and it is the policy to get signed applications before turning gas on. Furthermore, we can't establish credit like other businesses, because the amounts of the bills are so small that we can't justify the expense of checking our customers' credit.

Entirely Unreasonable

But does this satisfy our friend from the Middle West? No! He's entirely unreasonable! Of course, he does come down and sign the application and put up the meter deposit because he has to have the gas turned on. Of course, this situation couldn't happen today—all of this happened several years ago.

Now, let's take a look at what happens today: The fellow that bought Mr. Jones' business is a good businessman, and in spite of high taxes, makes enough money so that he, too, can retire and come to the Pacific Coast. He calls on the telephone and says he is too busy to get to the office, but he wants the gas turned on. He is told in a polite, quiet voice: Of course, he doesn't have to come to the office, the whole transaction can be taken care of by phone. A few questions are asked to establish credit, and no deposit is required.

The point I am trying to make is this: Often it isn't our customers who are unreasonable, it's our policies or our procedures.

Actually, the fellow who came in several years ago was no more unreasonable than his successor in 1952. If it is our policies and procedures that are unreasonable rather than the customer, then I think it is a good time to examine them.

The years ahead are not going to get any easier. We can't shrug off the competition of the electric industry. We will be in a position where we will have to increase rates for some years to come, and the public ownership boys are out selling salt. If our customers think we are unreasonable, they certainly are not going to be our friends, and our task of promoting our product, the price we charge for it, and the private enterprise system will be doubly difficult. So now is the time to take a good look at ourselves through the customers' eyes, and then do something about it!

Special Business

Our customers expect to be treated fully as well as they are by the grocery store, the department store, or the service station. Sometimes we seem to think that we are in a special kind of business and can be a little different. We can shove our customers around just a bit because we have so many of them. We just can't treat them as individuals, we have to treat them as account numbers because it costs too much to give individual attention.

We should treat our customers fully as well as these other kinds of businesses where the customer has a free choice as to where he spends his dollars. Let's get down to cases:

What would have happened if our solid citizen from the Midwest wanted

This paper was presented at the annual convention of the Pacific Coast Gas Assn. held in Los Angeles, Sept. 3-5.

the gas turned on and could not be home to let us in? Turning gas on is a little more difficult than turning on the water or electricity. We must get into the house to make sure all the appliances are off and to light them, and we can't get in unless somebody is home or we have a key; so we often saddle the customer with another problem at a time when she has her hands full just trying to move.

A few years ago it was the general policy of at least some utilities that a serviceman could not enter a premise unless there was an adult at home; or if this could not be worked out, then the customer could leave the key with a neighbor, and if the neighbor would accompany the serviceman, he would enter the house.

Now these companies had many unreasonable customers. They had all kinds of excuses, such as: "We are just moving in, and we don't know our neighbors," or "I will leave the key under the doormat. There is nothing in the house anyway." Or "I work all day, and I can't stay home just to let you in."

Reasonable Customers

Strangely enough, the customers got more reasonable when a new policy was introduced. This was known as the "note and key procedure." The customer could sign a statement if he was in the office, which read, "Permission is granted to enter the premises during my absence," and a notation was put on the order as to where the key could be found. If the customer was telephoning, she could leave a note giving permission to enter, and the serviceman would pick up this note and attach it to the order. This policy has been in effect for several years, and there has been no trouble or accusations which involve the serviceman.

Occasionally there is still an unreasonable customer. One called in the other day. She was moving from one side of town to the other and wanted the water heater lit so that she could clean up the place. She worked during the day and couldn't get down to the office to leave a note; and if the company insisted on having one, the only thing she could do would be to make a special trip all the way across town to tack one to the door. The water heater was on the back porch, and the screen door was unlocked; and she couldn't see why she had to leave a note.

The problem finally got to a supervisor, and the lady got her way; but it wasn't easy. You see, it was against the company policy!

Now, perhaps that policy should be rewritten. I'm sure the gas man is as honest as the laundryman, the grocery man, or the milkman, who probably enter the back porch when no one is at home quite frequently. Also, I am pretty sure that any plumber would have no hesitation about sending a man to light the water heater without insisting upon a note.

Nobody else would consider the customer unreasonable!

Usual Practice

Most department stores and the telephone company, at least in southern California, enclose self-addressed envelopes with their bills. The gas companies don't, and so some of our customers can't understand why we don't join the parade.

What happens when your customer asks for this same courtesy? Is he told, "Sorry, we can't afford to," or "It isn't our policy"? Here's a better way: Mrs. Smith makes this notation on the stub of her bill when she sends in her check:

> Come on. Send printed addressed *RETURN* envelope when you send bill!!! Your customers will be *VERY* pleased AND nearly ALL other businesses are sending them. I *DARE* YOU!

This is the letter Mrs. Smith gets back:

> Thank you for your note, Mrs. Smith. You dared us, so we accept your dare! Enclosed is a year's supply of self-addressed envelopes for your use. Seriously, Mrs. Smith, in view of the fact that a great majority of our customers prefer to pay their bills in person at various of our branches, it would be a waste of money to enclose self-addressed envelopes in each bill, as you can readily see that a majority of these envelopes would be discarded. However, Mrs. Smith, any time that you desire an additional supply of these envelopes, just simply write me a note, or a telephone call will do, and I will see to it that you are well supplied. Thank you very much, Mrs. Smith, for the opportunity to serve you.

Do you think Mrs. Smith likes this kind of treatment? Here's her reply and this, as well as the rest of this correspondence, is taken from an actual case:

> So glad you have that priceless gift: A sense of humor. Yes, I DID dare you to send me some envelopes and then tossed the thought away, as the *"Utilities" have a way of ignoring anything but an unpaid bill.*

This policy is sound and friendly, and the contact was handled so that the customer felt she was getting special consideration. Criticism was turned into commendation, and it didn't cost very much more to enclose a few envelopes than it would have to have just written a letter. I am sure the customer did not feel that the company was unreasonable.

All utilities discontinue gas service for nonpayment of bills only as a last resort; and usually by the time this step has to be taken, the person handling the account is quite provoked. The customer has ignored notices and has failed to cooperate, and often there is a feeling it is about time we made a Christian out of him. I believe it is the policy of most utilities not to turn the gas back on until the delinquent gas bills have been paid, and in some cases a deposit is also required to insure payment of future bills.

Customer's Reaction

Now the other side of this picture is, what does the customer think? He is probably thinking and talking about the gas company which has no heart and no understanding of his problem.

One utility has a new policy: Instead of making the customer prove that there are some very unusual circumstances which entitle him to some special consideration and then reluctantly deviating from the policy, it is their general policy to turn on the gas if the customer promises to pay.

Now, their experience has been good. About 95% of the promises are lived up to, and I am sure that a lot of customers don't feel nearly as unfriendly as they would have if the company had rubbed salt into the wound by insisting that the bills be paid first. They have gotten rid of a lot of unreasonable customers!

From time to time cutsomers go to the office to pay their bills and their statement shows that they owe, not only the current bill, but a previous amount. They say to the cashier, "I've paid all but the last bill." What does the cashier do?

In some companies she says, "Just a moment," and then calls up the bookkeeping department to verify that the previous bill has been paid. In other companies a little investigation showed that in almost all cases the customer knows what he is talking about. The bill is paid just as he says, and he isn't trying to cheat us out of anything.

What does the customer think when we say, "Just a moment," and start checking? He can think one of two things: Either we don't believe he knows what he is talking about, or he is trying to pull a shenanigan. It is still a good idea to do a little checking, but this can best be done when payments are being posted. If a current bill is paid, leaving unpaid the previous bill, a letter can be written asking if there has been some mistake. Usually the customer thinks he has paid the bill or that his wife has paid it—or it is found that the Old Man is still carrying the envelope around in his pocket, and the problem gets straightened out right away, which is usually much easier to do.

This procedure retains all the safeguards of having the cashier check; but it saves a lot of time for the customer and the cashier, and other customers are not waiting in line while the bills are checked. Whenever we give the impression that we doubt the customer's word, we must also give the impression that we are unreasonable!

Language Problems

Do you have any offices located where a large proportion of the customers are foreign born? These offices can create quite a language problem. We can't understand the customer, and the customer can't understand us, which makes any transaction difficult and creates misunderstandings.

One utility has solved this problem by making it a requirement that in these kinds of offices only employees who can fluently speak the foreign language may work there. They have found that customers appreciate this courtesy a great deal. They look upon the gas company as a friend. They even bring their letters written in English to the office and ask to have them interpreted.

If you received a letter from your boy overseas written in a language you could not read to get by the censors and knew that you could take that letter to the gas company where a friendly, courteous person would take time out to help you, wouldn't you think the gas company was a pretty good place to do business?

In most cities there are a good many so-called "unauthorized payment agencies" where utility bills may be paid. The customer makes his own deal, and the company has no responsibility if something happens to his payment. Once in a while something goes wrong, and the payment does not get to the gas company. What happens?

I know that this happens often. The customer is told that we haven't received the payment and that he should go back to the place where he paid it and start checking up. Why can't we go just a little bit further? Why can't we tell the customer that we haven't received the payment, but we will be very happy to check with the place where he paid it and try to get it straightened out for him? If we are unsuccessful in doing so, that we will let him know?

Of course, we have no responsibility of any kind to try to get it straightened out, and it means a little extra work; but here is another opportunity to show that we are friendly—not unreasonable!

How far should we go to collect for our mistakes, particularly when the dollar amount is small? I am thinking about meters that fail to record, or the cases where we make a mistake in our records and we bill Customer "A" for the gas actually used by Customer "B" and vice versa.

Sure, the customer who was overcharged should get a refund, and also the customer who was undercharged should pay for the gas he actually used; but how does the customer look at it? I think in many cases he figures, "Well, that is their mistake. Why should I pay it?"

If your wife bought a dress for $24.50 which somebody had mismarked, and the price should have been $29.50, do you think the store would ask for $5 more from you? I don't think so, and I am also pretty sure what your answer would be if they did ask you.

Somehow we feel we are a little different. The customer got the use of the gas; we should get the money. Besides, look how honest we were. We gave the refund to the customer we had overcharged. Maybe we think our halo is on straight, but from the customer's viewpoint, I'm afraid it has slipped a little bit!

Here's a poser, and one I certainly don't know the answer to: When the customer who doesn't bring his bill with him gets in line to pay his bill and finally arrives at the cashier's window, one of two procedures must be followed—either the customer is directed to another employee who will get the bill for him, or the cashier telephones the bookkeeping department and gets the bill herself.

Now the customer who stood in line and then had to go some place else is not going to feel too happy about it. On the other hand, those who are waiting in line and are delayed while the cashier gets the information are not going to feel very happy about it either.

Different Opinions

I think there is a difference of opinion as to which is better, but one utility in their larger offices does something about it. They have a man on the floor who observes those who are waiting to pay bills; and if a customer does not have a bill in his hand, he asks him if he will need one, and then directs him to the place where he can get it.

This customer feels that he is getting some attention; he does not have to wait in line, and then find out that he can't pay his bill; and the clerk to whom he is directed can take his payment, so that he does not have to get back in line.

Customers don't like to wait, and they resent being ignored. I'm afraid that in all of our companies they are sometimes kept waiting too long and may perhaps even feel that they are ignored. What can we do about it?

We have standards for many other things we do. If we are so rushed we can't get our bank deposit made up on time, we do something about it and quick! It may mean a new method, a new piece of equipment or another clerk,

but whatever is required will be furnished.

I doubt that our customers always get the same kind of attention as our precious records, and our standards for service will vary from office to office. Sometimes an improvement in our internal facilities will cut down wasting time; if so, we get a double benefit. When we save waiting time for our customers, we save our employees' time also; and we lay cash on the line for that. So, let's get some standards!

Telephone Procedures

How long is too long to wait? The American Telephone & Telegraph Co. has established standards for the entire Bell System. These are some of them:

The interval from the time the PBX operator rings the phone of the party who is to take the call to the time the phone is answered may not exceed 20 seconds. The time a customer may be kept waiting on the phone while a clerk gets information should not exceed 60 seconds if the records are in the same office.

If the records are in another office, the time should not exceed 120 seconds. If the customer is seated at the desk of an employee who is getting information, the interval may be as long as three minutes; but the interval does not seem as long to the customer, as he can see what the clerk is doing.

All letters must be answered, either by telephone or by another letter, by the end of the following business day. If the answer is not available within that length of time, then the customer is telephoned or written a letter of acknowledgment and must receive a final answer within 10 days from receipt of the original letter.

When I got the information about the American Telephone & Telegraph Co.'s program, I was told that at the time their standards were put into effect there was resistance and skepticism, and some thought that they were impossible to attain.

At first their score was only about 40 or 50% on calls being completed within the allowed time. Now if the score doesn't run 98 or 99%, it is a cause for raised eyebrows.

We need standards too, but let's set them to please the customer, not to make things convenient for us. Remember, when the telephone company or anyone else gives better service, then we suffer by comparison, and customers seem to get unreasonable when they get impatient!

What is the right policy on cashing checks? Surely, we aren't in the business of being a check cashing institution. We can leave that to the banks. But let's see how the customer looks at this problem. Your wife can get a check cashed at the market or the drug store or any other place where she regularly does business. In fact, she can probably get it cashed even though she is not a regular customer.

What happens when one of your good customers asks you to cash a check? Is it against your policy? Do you cash it reluctantly? Or do you treat the customer as well as the market or the drug store or any other place where she regularly does business and do it willingly with a smile?

Those gas companies that do haven't suffered increased losses from bad checks; but even if they did lose a few dollars every year, they are buying a good deal for those few dollars. From the customers' viewpoint, the only reason you won't cash a check in a reasonable amount, is because you question whether the check is good. This is a place where the wrong policy can certainly make many unreasonable customers!

Letters can cause as many unreasonable customers as anything else. Even the most generous policy is sometimes explained so that the customer thinks it is unreasonable.

Improving Letters

Two utilities on the West Coast have spent some money and effort to improve their letters by making them more friendly and human. The results have been amazing, and the effects have not been confined to the letters, the people themselves in their daily contacts with customers have a better understanding of what they should do and how to do it. Here are some examples, and there are many more:

One customer wrote:

> I certainly thank you for this favor and do appreciate your consideration, also the two friendly letters I received when making previous requests.

Another:

> You know, Mr. Smith, I feel glad that this mistake happened. Everyone has been so lovely and courteous, from my telephone call to your letter today. It just shows the personal attention each customer receives when an error does happen.

Again:

> I would just like to say it is a pleasure to walk into any one of your offices and be greeted by such friendly and courteous people. It is often so easy to write letters of complaint but so few write letters of commendation. I just wanted you to know that these little courtesies do not go by unnoticed.

When we stop to think about it, aren't we indicted by the fact that our customers seem a little bit surprised when they are treated as individuals and as friends? You would think they would expect it and accept individual and friendly treatment as a matter of course, not something unusual.

Friendly letters can pay off, not only in good customer relations, but in hard cash. Recently a company made a mistake and billed for only one meter where two meters were supplying gas, because one of them was nonregistering and had failed to record for about two years. The customer could not be contacted except by letter. This is the final paragraph of the letter that was used:

> We would appreciate very much your sending us your opinion regarding the accuracy of our estimate. If your records show

that your operations during the period of the estimate differ substantially from the preceding two years, it would be very helpful if you could give us some idea of the percentage of these factors in revising our estimate. *Our chief concern is to submit an additional billing which will be fair from your standpoint.* Please let us know if you require any further information relative to this billing. We will be happy to supply any of the details in which you may be interested.

The estimated additional bill was $1,045.03. This is the reply from the customer:

After receiving your letter with reference to the defective gas meter, we checked our records for the past two years and find that you are correct in stating that it had been entirely out of operation during that period. It seems to us that the bill that you rendered is equitable, and we will forward our check to you in that amount within the next few days.

Boy, oh boy! Was that customer reasonable!

Bad Impression

Sometimes the fact that our companies are so large creates an impression that we don't care. Here is an actual letter:

Please file this under: "Hold-Your-Hats-Boys-Here-We-Go-Again!"

It's like this—on January 1 . . . just as the old year closed we purchased a range on a gas company contract. At that time we lived at 628 Green street, Oldtown. If we could have looked ahead, God knows we'd be living on kippered mackerel or cooking on an oil stove. When we bought the range we were a happy little family. Now we snap at each other, my husband is dyspeptic, and I am just a hollow wreck of the beautiful woman who signed on the dotted line!

On August 6, with naive innocence, we moved to 114 N. "A" street. It all seemed so simple to us. We notified your company! You turned the gas off in Oldtown! You turned it on in Newtown! Later an admirable youth came to check our water heater! All was happiness . . . and the future looked bright!

At this point perhaps I should tell you that each month we sent the Newtown office a darling little blue money order for the current bill and the range payment.

About five months after moving we began to receive letters from the office saying that we had no payments for five months. Finally a harried young man came to the door and announced that he would remove the range bodily unless I made the delinquent payments. Anxious to reduce his blood pressure I displayed our receipts. This resulted in a beautiful friendship. Our deductions at this time were that the Newtown office was keeping secrets from the Oldtown office more in the spirit of fun than anything else.

For two weeks we lived in a Fool's paradise. We are simple folk and will not attempt to explain the workings of Mother Nature, the Einstein Theory or the Gas Company, but . . . so help me! . . . we received a letter from the Newtown office saying "What . . . no payments!"

We wrote Mr. Johnson assuring him of our complete cooperation and offering to move back to Oldtown if this would help your little clerical pixies to get things straightened out. From his reply, Mr. Johnson was more angry than hurt.

Meanwhile, as though the custody of our range was not enough to occupy our every thought, we have had a beautiful baby girl. We needed more room. We moved to 618 Tenth street, Newtown. With a faint heart and deep misgivings I notified both the service and contract departments of this epochal event and waited for the deluge. Sure enough . . . here came your letter!

Now, Mr. Brown . . . something tells us that you strike a calm, clear note in all this whimsy which makes your company so interesting, yet so difficult. Surely there is some solution. We hope to buy a home within the year, but will hold all in abeyance until we have your assurance of the gas company's permission.

At the present time we plan to have a garden party and beer bust for the entire contract department. At midnight, skyrockets will go up and a little girl dressed as the Spirit of Barbara Fritchie will scatter our receipts from a flower-bedecked basket. This seems rather radical as well as expensive, but we are at our rope's end.

But *do* something! Don't just *sit there!*

Fortunately, this talented customer, in addition to being clever, had a sense of humor, and I am sure that everything was straightened out to her satisfaction; but why do things like this happen? Why is it that the right hand doesn't know what the left hand is doing?

It is because somebody, somewhere, doing a routine, simple job doesn't see the picture and doesn't understand what happens when they "let George do it," or the procedure is wrong.

When things like this do happen, we shouldn't kiss them off as isolated cases until we know they are. The reason for the mistake must be found. Perhaps it is the method, lack of supervision or carelessness, or lack of training or understanding. The customer doesn't care about the reason, he just doesn't like mistakes!

Little Courtesies

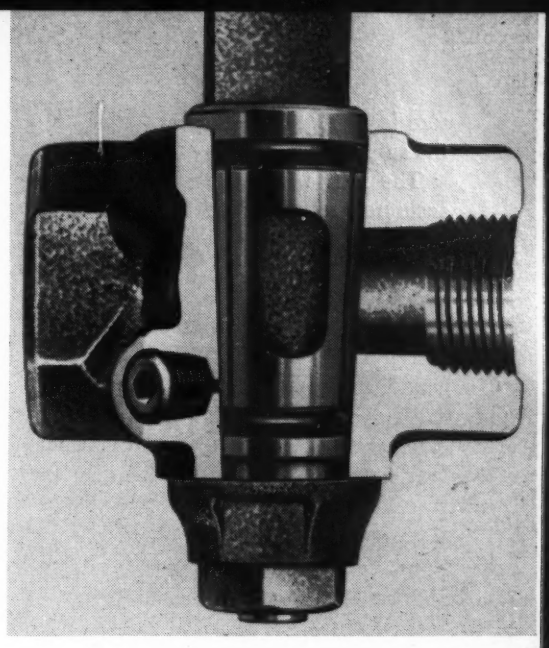
All of the things I have mentioned are little courtesies or nice ways of doing business. They don't cost anything but they help us look reasonable, and they help us make friends.

What are the things your friends do that make them your friends? They don't greet you at the front door as if you were a magazine salesman. You get a friendly greeting and a smile, even though they may wish you had picked another time to call. They take an interest in your problems and will go out of their way to help you, even when they think it was your own fault you got into such a mess in the first place. They don't write you letters that start off, "Yours of the first received."

They treat you with consideration, and you know they think of you as a very special kind of individual. These are all little things that aren't measured as dollars, and even the poorest man can afford them.

Why are we in business? We're certainly not in business to perpetuate policies set up in 1890! We are in business to give service. When we think a customer is unreasonable, let's put ourselves in his position; and then examine our policies and our practices and see who is *really* unreasonable!

If you agree—do something! Don't just *sit there!*



This new meter stop was developed by the Mueller Co. to meet the gas industry's need for a leak-proof stop that is easily operated and maintained. Shown at right is a cutaway view.

New Gas Meter Stop Developed by Mueller

By FRANK H. MUELLER
Mueller Co.
Decatur, Ill.

THE changeover of gas distribution systems to natural gas at higher pressure has materially changed the requirements for a satisfactory gas meter stop. Tests indicate that gas leakage in the low and medium pressure range increases directly with the gauge pressure. Hence, a stop that was leaking an undetectable amount at 7 in. wc may leak ten times that much at 2.5 psig. Even though this might not be a dangerous leakage, it could easily result in service calls. Since most stops when new will hold any distribution pressure now used, this actually means that it is now even more important that a stop maintain its original holding qualities and, in addition, be provided with a simple means of restoring its original holding qualities.

Exclusive

The use of higher pressure means the possibility of dangerous pressure on the meter and household appliances in the event of failure of the pressure reducing valve. Higher pressure may, therefore, not only create a dangerous situation which was not possible with low pressure, but it also reduces the time in which the situation can be brought under control. A meter stop is the first and often the only emergency shutoff and should be readily operable with the most common household tools.

Even with low pressure distribution, an occasional explosion resulted from a broken stop when an inexperienced person attempted to operate the stop by turning the nut, loosening the nut and tapping the key loose, or tightening the nut. Higher pressure accentuates this danger and requires a stop which eliminates the necessity for such operations.

A review of these considerations indicates the following meter stop requirements for medium and high pressure gas distribution:

1. The stop should not leak at its rated pressure in either the open or closed position, and it should retain its pressure tightness over a long period of time and many operations without any maintenance. It should never leak out the top or bottom, whether maintained or not.
2. The stop should be easily operable with the ordinary household wrench and it should retain this ease of operation for a long period of time and many operations without any maintenance.
3. The stop should be provided with simple means for restoring the original holding and turning qualities.
4. The stop should be so constructed that an inexperienced or uninformed person cannot create a dangerous situation in an attempt to operate the stop with any ordinary household tools.
5. The stop should be of a type with which everyone is familiar, and its ordinary operation should consist solely of a simple turning on or off.
6. The stop should be as low in price as is consistent with these essentials.

The new Mueller LubOseal gas meter stop was designed specifically to provide these qualities to a very high degree at a moderate cost. This stop is essentially an iron-body, brass-key, plug stop; a type of valve that is familiar to everyone who has operated a gas stove or other gas appliance. Operation consists of 90° turn of the head, and the head clearly indicates the on and off positions.

Like all ground key stops, the LubOseal does not expose the seating surfaces to the fluid when in the open position but, in addition, the LubOseal is provided with false ports in the key and body which line up with the true body and key ports, respectively, in the off position to prevent grit or dust from attaching itself to the seating surfaces when the stop is closed and later damaging them. This allows the gasway through the key to have flat sides, and consequently reduces the pressure loss, makes the key much stronger for the same weight of metal, insures seating contact at only those areas where it is useful, and reduces the contact area and turning torque.

Circumferential grooves are machined in the top and the bottom of the key and are connected by four machined vertical grooves at 45° with the ports. The vertical grooves are relatively narrow so that they reduce the generous lap by a minimum amount. The key is reduced in diameter above the top grooves and the body is increased in diameter from a point just above the top of the bottom groove. This eliminates the production of shoulders when the key is lapped into the body. It also eliminates any contact of the key and body valve above and below the circumferential grooves.

The major feature of this stop is the use of synthetic rubber, gas-resistant "O" rings. These are remarkable pressure sealing devices which have the amazing qualities of being simple, self-sealing, effective, permanent, low in friction, and capable of sealing small clearances. Their first important application was in the hydraulic systems of airplanes during the last war and they have since proved their effectiveness in many commercial products.

The ability of the O rings to seal small clearances means that in the LubOseal stop, there is no rubbing contact above and below the O rings. The importance of this will be brought out later, but the effectiveness of the O rings is well demonstrated by the fact that the LubOseal stop is the first ground key stop which the Mueller Co. has ever been able to pressure test to the destruction point of the casting.

An ordinary stop leaks so badly out the top and bottom at 1200 to 1500 psig that the pressure cannot be raised any higher. A ¾-in. LubOseal body casting broke at 4800 psig without any leak whatsoever up to that point. It is believed that the O rings at the top and bottom of the LubOseal stop provide positive assurance against top and bot-

tom leaks regardless of the condition of the stop.

The four vertical grooves, which are accurately machined in the surface of the key, line up with a small hole in the stop body when the key is in any off or on position. This hole has an outside termination in a ⅛-in. standard iron pipe thread. This provides for the introduction of grease to the four vertical grooves, the circumferential grooves, and the O rings. Since the O rings are the extremities of the contact surfaces, we believe this is the first and only lubricated stop that permits the lubrication of 100% of the contact surfaces while the stop is assembled.

Taking advantage of this construction, LubOseal stops are assembled without grease. This allows the stop to be tightened just to the point where metal-to-metal contact is obtained between the key and the body, the point of optimum adjustment. The specially designed, "tamper-proof" washer is then drilled with a blind hole and pinned to a large boss on the bottom of the key. Except for minor adjustment obtainable by the spring in the pin, the stop is now permanently fixed at the point of perfect adjustment and will remain there regardless of what might be done thereafter with the nut.

Lubricating Grooves

The lubricating grooves are then filled by forcing grease into the tapped hole in the body. Sufficient pressure is used to fill the grooves completely, force the air past the unlubricated ground key surfaces, and compress the O rings until they occupy a minimum space in the O ring grooves. As the stop is turned, the O rings try to regain their original shape and, in so doing, keep pressure on the grease and help the vertical grooves to distribute a uniform grease film of just the proper thickness for easy turning, long life, and best pressure sealing qualities. When the O rings regain their normal shape, the contact point with the wall of the body moves inward into a region formerly occupied by grease, so that the O ring contacts are greased in this process also.

The storage of grease pressure by the O rings is one of the reasons LubOseal stops have such a long operating life without regreasing. Although no positive provision is made to prevent the escape of this pressure when the vertical grooves are passing the ports, the vertical grooves, being machined, are so proportioned that the pressure of the O rings moves the grease very slowly and all of the pressure is not dissipated until after a large number of operations. On actual test, a number of LubOseal stops were in practically their original condition after 1000 operations while many regular stops had begun to turn hard and leak after 50 operations.

The stop is not designed to be sealed by grease in grooves under pressure because this kind of a stop requires lubrication after every operation or at least very frequently. The lubricating grooves are needed to maintain a proper grease film on the precision machined and lapped ground key surfaces so the surfaces will hold pressure and turn freely.

Ground Key Seal

The drilled hole in the body which connects with the grease grooves in any open or closed position is located below the port so there is always a ground key seal between the pressure and the grease port. The tapped outlet of the grease port is sealed with a hardened, socket-head pipe plug. Normally there would be no leakage out the grease port if the pipe plug were not in place, but in any lubricated stop there is some tendency for gas to find its way into the grease grooves and escape past the grease screw. The use of a pipe plug makes a pressure tight seal to prevent this. Moreover, the machined grooves reduce the chance of leakage and the grease capacity of the LubOseal stop to the point where, once it has been filled, a very small amount of grease is needed to completely refill it. If the LubOseal stop needs greasing as indicated by its turning quality, all that is required is to remove the pipe plug, fill the tapped hole with grease, and screw the pipe plug down to its seat again. Unlike the familiar, lubricated stop, there is no grease screw to invite frequent or excessive greasing and it is not so likely that the socket-head pipe plug, which requires an uncommon tool, would be removed. The use of bulk grease instead of grease sticks is more economical and does not introduce unwanted material (the coating on grease sticks) into the stop. The greatly reduced grease capacity of the LubOseal stop, as compared with an ordinary, lubricated stop, appreciably reduces the investment in grease alone.

The perfect adjustment and grease film obtained in the LubOseal stop is practically unobtainable in a stop which must be greased before it is assembled. As a result, LubOseal stops turn more easily and far more uniformly than stops manufactured previously. These stops will turn from ½ to ⅓ as hard as good regular stops when new, but the LubOseal will maintain this torque closely, whereas a regular stop will turn progressively harder. LubOseal stops as assembled will require a torque in inch-pounds of from 100 to 135 times the nominal size of the stop. This means that a 2-in. stop would require a maximum torque of 270 in. lbs, which is only 27 lbs on a 10-in. wrench and even turning this easily, it will hold 125 psig.

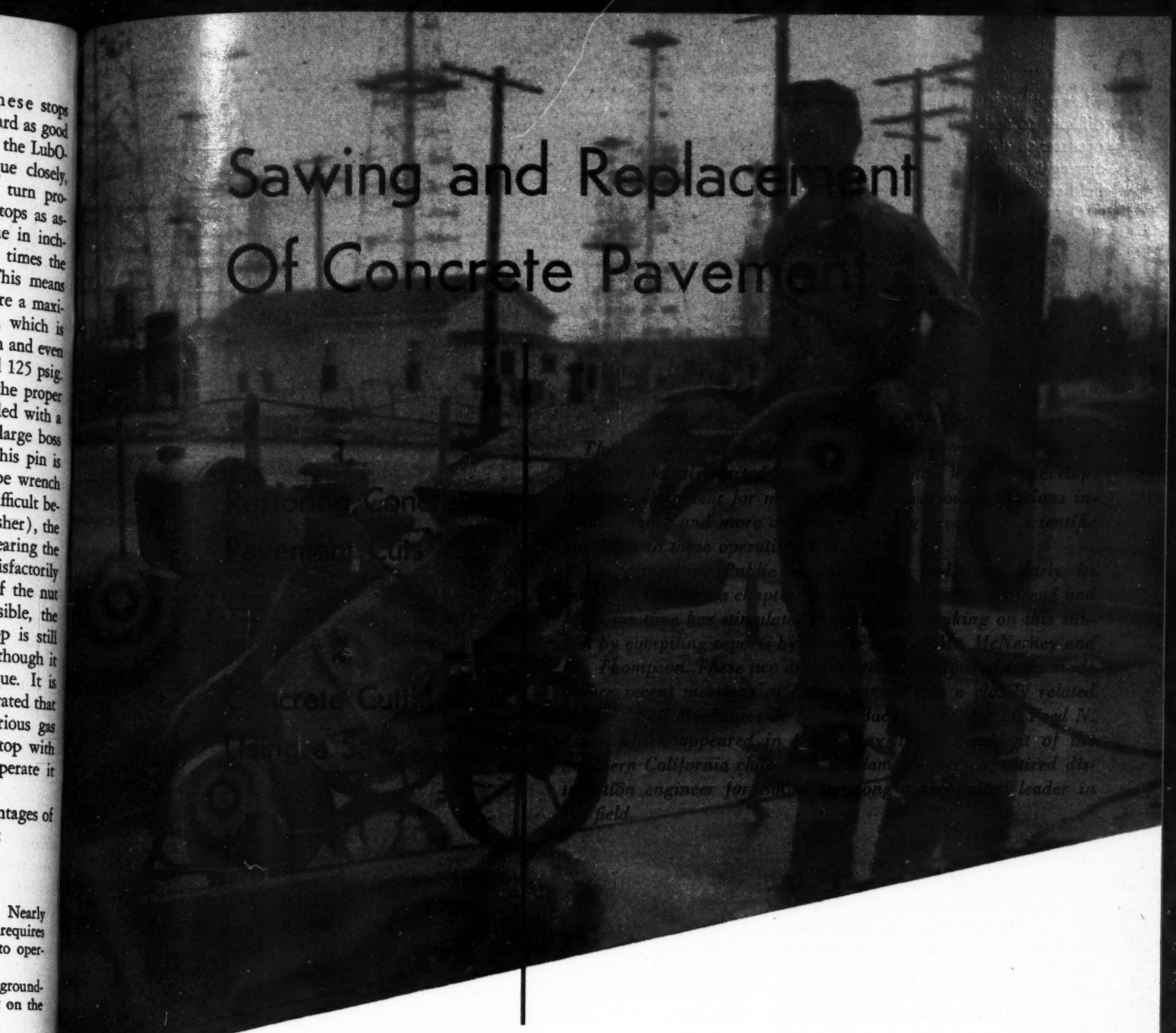
As mentioned previously, the proper adjustment of this stop is sealed with a pin through a washer and a large boss on the bottom of the key. This pin is strong enough so that if a pipe wrench is placed on it (this is very difficult because of the design of the washer), the key can be twisted without shearing the pin. The stop performs satisfactorily even if the nut is removed. If the nut is tightened as much as possible, the threads will strip and the stop is still operable and in good shape although it will have a high turning torque. It is believed and has been demonstrated that a person cannot produce a serious gas leakage out of the LubOseal stop with any tool commonly used to operate it even if he tries to do so.

A brief summary of the advantages of the LubOseal stop is as follows:

Advantages

1. It is a simple type of stop. Nearly everyone is familiar with it and it requires no special knowledge or training to operate.
2. A precision-fitted and lapped-ground-key stop designed to insure contact on the generous sealing surfaces only.
3. A stop with an inherent, low-turning torque, which is held to close limits in manufacture and does not change appreciably with time or use.
4. A stop which retains its superior pressure holding qualities without maintenance.
5. A stop with positive extra protection against leakage to the outside.
6. A stop which provides automatic maintenance of the proper grease film for an extended time.
7. It has provision for easily restoring the original turning and holding qualities of the stop.
8. It is the only stop in which *all* of the rubbing surfaces can be lubricated with the grease system.
9. A sealed grease system to prevent leakage through the system itself.
10. A stop with the proper adjustment permanently fixed at the factory.
11. A truly tamper-proof stop with full provision for preventing a dangerous leak to be caused by anything that might be done in an effort to operate it.
12. A stop of moderate cost.

Sawing and Replacement Of Concrete Pavements



1. Restoring Concrete Pavement Cuts

By JOHN McNERNEY • Portland Cement Assn.

WHILE the use of concrete saws in controlling pavement breakage when making service cuts or other openings in concrete pavements is a relatively new procedure, it is already becoming widely accepted. The development of this practice has been closely followed with much interest. Field observations indicate it to be particularly advantageous where openings in concrete pavements are to be replaced with concrete.

"Saw controlled breakage," as the term is used, means saw cutting the pavement opening outline to a depth of about ¼ the slab thickness prior to breaking out with some type of mechanical breaker. Experience with various depths of contraction joints in concrete pavements has shown that a cut of this depth is somewhat more than sufficient to control breakage. Actual trial cuts on the project may permit a reduction in the depth of cut which can be safely used.

Since this discussion will involve jointed concrete pavements, it seems advisable to review briefly the development of current jointing practice and to define some of the terms most commonly used.

Most of the earlier concrete pavements in California were constructed without planned joints. At the end of each day's work, a "cold" or construction joint was formed. *Fig. 1* shows a modern-keyed construction joint with tie bars which is commonly used.

Within a relatively short time after construction these pavements developed transverse cracks owing largely to shrinkage. These irregular cracks were some-

Presented before the Southern California chapter of the American Public Works Assn.

what unpleasing in appearance and were difficult to seal. The frequency of their occurrence depended upon the type of aggregate used, mix design, and other field conditions.

Occasional compressive failures or "blow-up" in some of these early pavements were considered evidence that expansion joints were needed. As a result, engineers began providing space for expansion at regular intervals by installing ½-in. to 1-in. strips of wood, fibre mastic, or other easily compressible material. Over the years, various expansion joint intervals were used, usually varying from 50 to 120 ft. *Fig. 2* shows a typical expansion joint.

A few years later, most agencies began using contraction joints *(Fig. 3)* between expansion joints at intervals of about 15 to 30 ft to control cracking. These joints, usually formed by means of a narrow transverse groove or strip in the top ¼ (approximately) of the pavement, caused it to crack below the groove. These grooves were then sealed with a mastic to prevent the intrusion of water and uncompressible material.

Subsequent engineering studies have shown the use of expansion joints at regular intervals to be unnecessary under all but extreme conditions. In 1945, the California Division of Highways discontinued the use of expansion joints except where the pavement abuts a structure. They now install a pre-molded strip-type contraction joint at 15-ft intervals. These joints are not sealed. Use of concrete saws in forming a new type contraction joint by cutting a narrow transverse slot of the required depth in the top of the slab is receiving considerable attention.

Mechanical load transfer devices have usually been provided across expansion joints or construction joints. Loads are transferred across contraction joints by means of the interlocking of the aggregate in the rough face of the crack below the formed joint. In actual practice, this

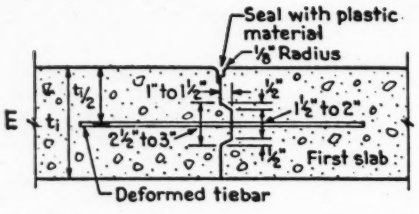


Fig. 1. A modern-keyed construction joint with tie bars.

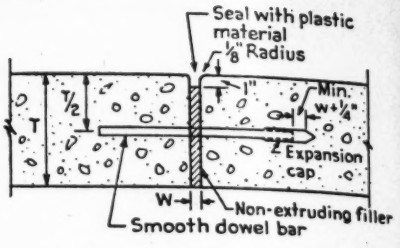


Fig. 2. A typical expansion joint.

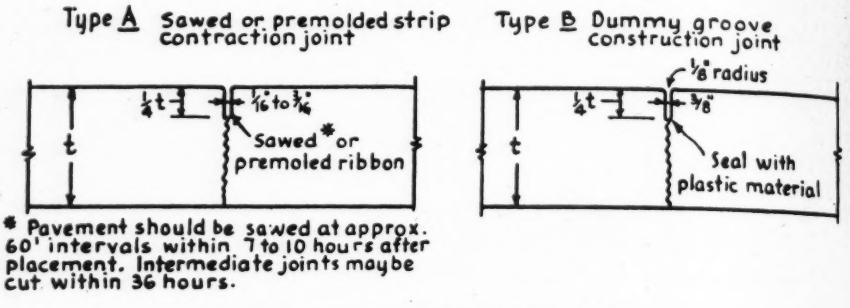

Type A Sawed or premolded strip contraction joint
Type B Dummy groove construction joint
¼t
1/16 to 3/16
Sawed * or premoled ribbon
t
⅛" radius
⅜"
Seal with plastic material
* Pavement should be sawed at approx. 60' intervals within 7 to 10 hours after placement. Intermediate joints maybe cut within 36 hours.

Fig. 3. Contraction joint to control cracking.

interlocking of approximately ¾ of the slab thickness has proven to be adequate when expansion joints are not used.

A number of types and models of concrete saws and mechanical breakers are being used for opening concrete pavements. There are, however, preferable procedures which can be used in breaking out between sawed outlines in order to produce a face as nearly vertical as possible and to reduce underbreakage. Since only about ¼ of the slab thickness is cut, the remaining ¾ presents a rough irregular face. It is this irregularity which will act to key the new concrete patch to the old pavement and to transfer loads across it, exactly as aggregate interlock does across planned contraction joints.

Observation of a great many concrete service cut patches in pavements indicates that a crack is likely to form at the juncture of the patch with the old slab on at least one side except where extremely narrow widths are involved. As service cuts are normally only a few feet in width, concrete drying shrinkage is much less than that in slabs where joints are spaced 15 ft apart. These cracks should, therefore, be narrower and, other things being equal, offer better load transfer than that normally provided by aggregate interlock across a contraction joint. While breaking out methods may vary somewhat using different types of equipment, an initial break is usually made midway between the outline cuts. Two final passes are made on the sides to break to the cuts. This is done to minimize underbreakage and to provide a rough face below the cut as nearly vertical as possible.

The saw cut provides a clean vertical face at the surface reducing the spalling or ravelling which often accompanies any opening method which may produce "feathered" edges. In *Fig. 4* may be seen two service cut patches side by side on the same pavement, one constructed using a saw to control breakage and the other using the old method. Note the clean spall-free outline of this patch.

Some agencies install concrete patches of greater thickness than that of the pavement being replaced. In some cases, this is done as a safety factor in case proper compaction is not obtained. In other instances, this practice is followed where old thin concrete residential streets are to be patched. Concrete strengths under normal field conditions continue to increase beyond 28 days. Old, relatively thin concrete pavements often satisfactorily handle traffic loads beyond those that could be safely carried by equal thicknesses of concrete pavement at early ages.

Occasionally an engineer has expressed concern over the possible intrusion of water through shrinkage cracks that may develop at the patch edges. Where properly designed concrete mixtures and correct placement methods are used, any such cracks are so narrow that sealing is unnecessary.

Probably the biggest single factor behind the successful patching of service cuts in pavements is proper compaction

Fig. 4. Comparison of saw cut (left) with ordinary cut (right).

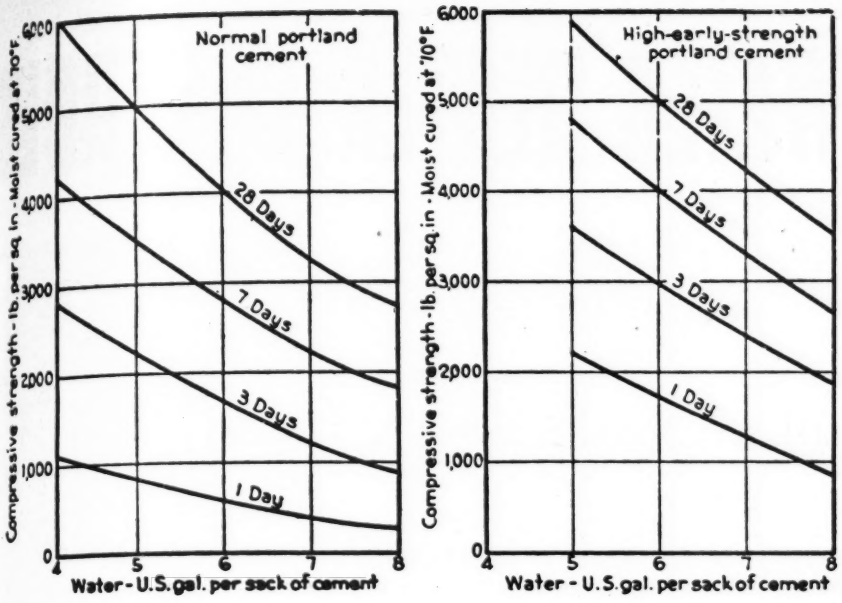

Normal portland cement
28 Days
7 Days
3 Days
1 Day
Compressive strength - lb. per sq. in. - Moist cured at 70°F.
Water - U.S. gal. per sack of cement
High-early-strength portland cement
28 Days
7 Days
3 Days
1 Day
Compressive strength - lb. per sq. in. - Moist cured at 70°F.
Water - U.S. gal. per sack of cement

Fig. 5. The age-strength relationship for normal and high-early-strength cement.

Table 1. *Per Cent Increase in Compressive Strength of Concrete with 2% Admixture of Calcium Chloride

Mix 1:2:4, 6½ Gal. Water Per Sack of Cement 70° F Damp Curing

Age at test	Increase in strength, per cent of strength of plain concrete
1 day	128
3 days	64
7 days	31
28 days	13
3 months	9
1 year	8

*"Effect of Calcium Chloride on Portland Cements and Concretes" by Paul Rapp, PROCEEDINGS OF HIGHWAY RESEARCH BOARD, National Research Council, December, 1934.

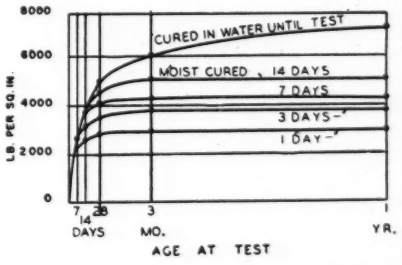


Fig. 6. Relation between curing conditions and compressive strength of concrete.

of backfill. The loss of subgrade support due to settlement or shrinkage can seriously affect the performance of any pavement. The importance of satisfactorily compacting trench backfill bears stressing.

Owing to the size of the work, sometimes certain fundamental principles are neglected in construction of concrete patches. The same care in designing and controlling the concrete mix and in placing it is just as important as in a full scale paving project. The concrete, of course, may be mixed on the project or in transit mixers. Aggregate gradings and mix proportions should conform to those used for paving concrete although it is recommended that the maximum size of aggregate be limited to 1½ in.

Cement content ordinarily need not be above that normally used for paving concrete with the locally available aggregate. With 1½ in. maximum aggregate, this would usually be about 6 sacks of cement per cu yd. Quite often it is necessary to reopen patched areas to traffic as soon as possible. Where this must be done, higher concrete strengths can be produced at early ages by using 2 lbs of calcium chloride per sack of cement in the mix, or with Type III cement (high early strength), if it is readily available.

Fig. 5 shows the age-strength relation for normal and high-early strength portland cements. Note that one-day and 3-day strengths, using high-early strength cement, are about equal to 3-day and 7-day strengths respectively, using normal cements. *Table 1* indicates the percent increase in compressive strength of concrete with 2.0% admixture of calcium chloride.

In order to minimize initial shrinkage, as stiff a mix as can be placed should be used. This will involve some hand tamping by the workmen in order to get a smooth dense surface but shrinkage will be low. By delaying tamping until the concrete has begun to stiffen, shrinkage is further minimized. The use of concrete with a slump of about 1½ in. to 2 in. is recommended. Next to backfill settlement, the use of high slump concrete would appear to be most often responsible for poor patches.

Subgrade and cut edges should be dampened before placing the mix in order to promote bond and reduce absorption of water from the mix. Painting the cut edges with cement grout is probably not justified as a general practice. When screeding off the fresh concrete, thin shims should be used on the old pavement for the screed to ride upon. This permits the new concrete to project slightly above the old surface. After being allowed to stiffen, the patch is then finished to match the surface texture as well as the elevation of the old pavement.

It is particularly desirable to obtain a smooth juncture between pavement and patch both from the standpoint of rideability and from the standpoint of reducing the impact effect of moving loads.

Another fundamental requirement of good concrete is proper curing. While there are many satisfactory curing methods, most agencies in this area now use the membrane type cure. This is particularly convenient for patching work. Waterproof paper, cotton blankets, wet burlap or even damp earth may be used. Where practical, some method of curing should be used for 72 hours. *Fig. 6* shows the effect of curing condition on compressive strength of cements. Note that the compressive strength of specimens moist-cured for 3 days tested at age 3 months is approximately 30% greater than that of specimens moist-cured for only one day.

Transverse joints should be installed in the patch to match joints and transverse cracks in the pavement. A tooled groove or strip type contraction joint should be placed in the top of the concrete patch where contraction joints or cracks occur in the pavement. If expansion joints have been used in the pavement, equal width expansion joints should be installed in the patch at the same point. Otherwise, when the temperature of the pavement increases above that at which the new concrete was placed, the narrow patch would be required to take most of the compression developed by expansion of the entire pavement.

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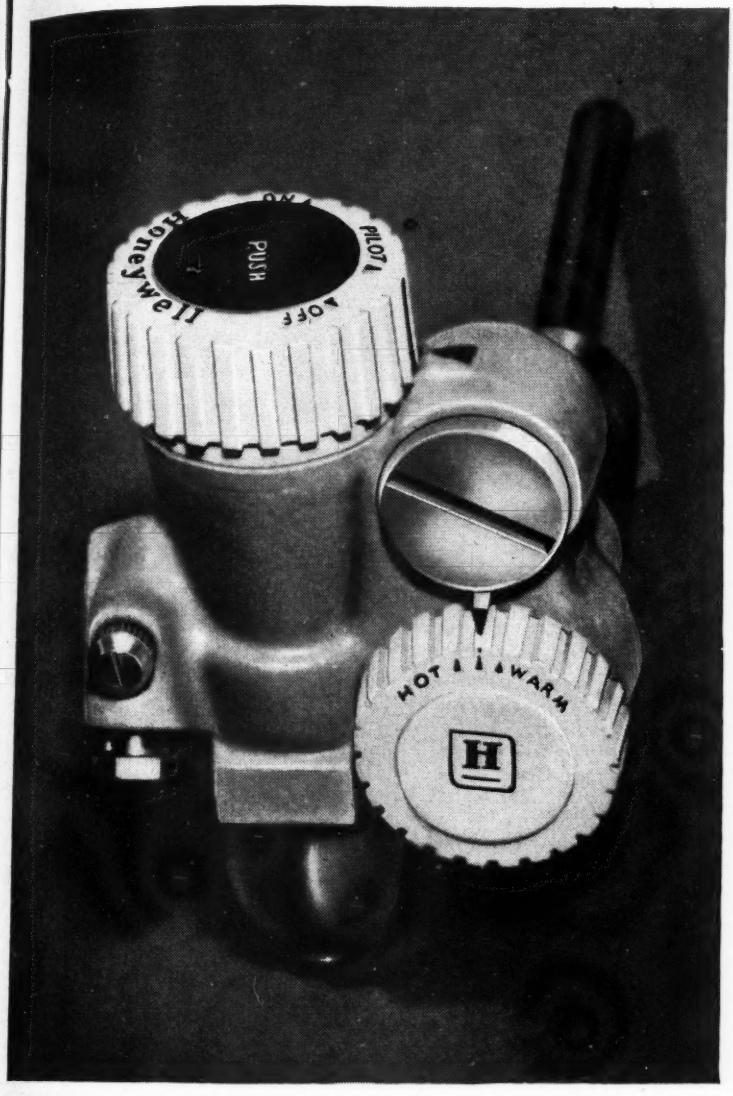
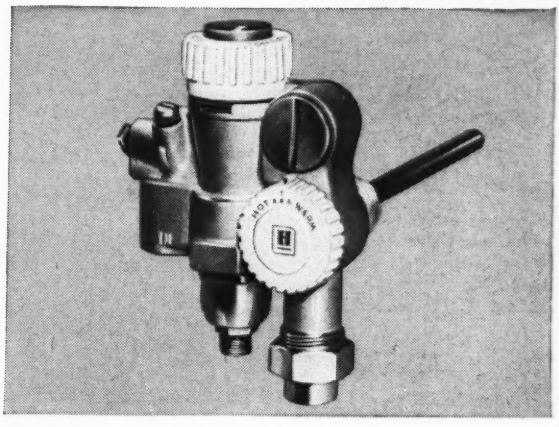
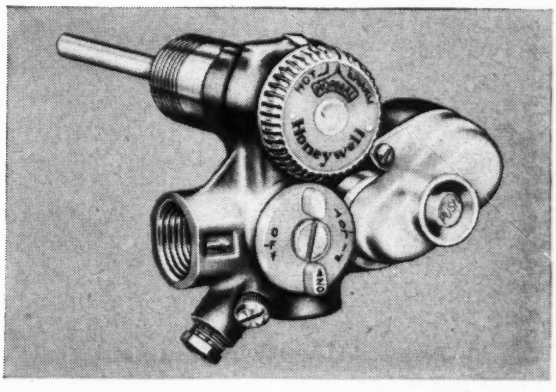


The "20"— Model V-5120 is the star performer in this big new line of Honeywell water heater controls. It provides *complete 100% control* for natural, manufactured or LP gas! Main gas cock with pilot position, main burner pressure adjustment and the thermomagnetic pilot with 100% shut-off are all included in this compact control. Thoroughly tested at the factory to assure safe, efficient, trouble-free performance.



The "21"— Model V-5121 is the thin model in this great new line of Honeywell Controls. It's primarily designed to take up minimum space so it can be used as a concealed water heater control. The "21" provides complete 100% control for natural, manufactured or LP gas—and includes the main gas cock with pilot position, main burner pressure adjustment and the thermomagnetic pilot with 100% shut-off in one compact unit.



The "19"—Model V-5119 combines lower cost, rugged performance with attractive appearance! This fine thermostatic gas valve can be used for natural or manufactured gas. (Not suitable for LP gas.) It is sturdily built and carefully adjusted to give long, satisfactory service. Its compact design incorporates the following: snap-action thermostat; main gas cock with pilot position; integral pilot adjusting screw; main burner pressure adjustment; safe lighting thermomagnetic pilot.

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Concrete saw in action, cutting sidewalk. The watercooled blade is mounted on a small carriage and is powered by a 9½-hp gasoline motor.

2. Concrete Cutting Using a Saw

By CHARLES S. THOMPSON
Assistant Civil Engineer
Long Beach, Calif.

ALTHOUGH concrete cutting with a saw is still a relatively new and expensive operation and consequently a subject of considerable controversy, seven years experience with it have convinced the city of Long Beach (Calif.) that the advantages outweigh the disadvantages and the city is now enforcing its use through the excavation ordinance.

Studies have shown that on long-distance pavement trenching jobs, concrete sawing actually saves money. On short jobs, pot-hole and bell-hole work, it is admittedly expensive and in these types of operations the city has encountered considerable resistance from contractors. The unit costs of completing these jobs with saws are higher than with jackhammers. Nonetheless, we enforce the ruling, which sometimes takes some doing, but in the end we get a better appearance and a better patch.

In the long run, we may find that money is actually saved by eliminating repatching and repairing of deteriorating jackhammer patches. The economy of using a saw in conjunction with a stomper on long trenches is shown by the savings in both time and labor, particularly in the removal of the concrete.

Appearance is an important intangible and we in Long Beach are becoming increasingly aware of the need to spruce up our city wherever possible. We have long since graduated from the status of a sleepy resort town and we want to show it. The public relations value of this policy is immeasurable.

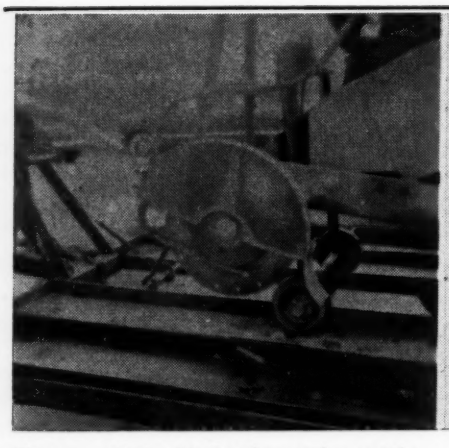
For example, concrete sawing helps sooth the taxpayer, who is understandably upset when he sees a beautiful concrete street for which he has helped to pay being broken up with jackhammers. A neat saw cut is immeasurably easier to accept.

From a dollars-and-cents standpoint the chief advantages are long-range. Concrete sawing drastically reduces the spalling that in time widens and becomes a ragged crack that must be repaired. The shattering and undercutting of concrete on either side of the trench, which occurs frequently in jackhammer work, is eliminated if proper care is used. This type of damage, being hidden, will not become apparent for months or years.

Along one street in Long Beach we recently noticed that considerable damage was beginning to show up on either side of an old patch where a jackhammer had been used. The failures extended out as far as 18 in. from the old line of the trench. The cracks were gradually widening and water had seeped into them, opening them up even further and permitting us to view the shattering and undercutting that had resulted from the use of jackhammers.

If the patch continues to deteriorate as we think it will, eventually it will have to be taken up and replaced with a much larger, sawed patch. Any imme-

This article was adapted especially for *GAS* from an illustrated talk by Mr. Thompson presented before a meeting of the American Public Works Assn.



Closeup of the blade shows the notches which give it a saw-like set. The cutting edge is coated with black diamond dust.

Although homemade, this saw is equipped with a hydraulic driving mechanism like that on many newer model commercial saws. The cost of the drive is more than offset by the savings in blade wear.

A clean saw cut in a sidewalk. Here the aggregate was cut through evenly and no rock was chipped out of the concrete.

diate savings will thus be more than canceled out. In fact, we may end up resurfacing half the street.

The chief item of cost that makes the saw cutting expensive is the blade which is coated with diamond dust and sells for $125 or more. Some cost as much as $190. The life of a blade is usually about 1500 ft of lineal cut. A contractor will charge 20 cents or more per foot, so the cost per trench foot will be upwards of 40 cents.

Saws are not infallible, of course. A patch is no better than the backfill and many jobs have been spoiled in the past by poor backfill and workmanship. Misuse of the saw itself can also bring about deterioration. The technique that experience has shown to be best is to follow the saw with a stomper, run straight down the center-line midway between the cuts. Jackhammers should then be used only to cut up the larger chunks that have already been broken away but they must be used only in the center portion of the trench, within an area extending no more than half-way to the saw cut. Use of either stomper or jackhammers too close to the edges will produce spalling and shattering.

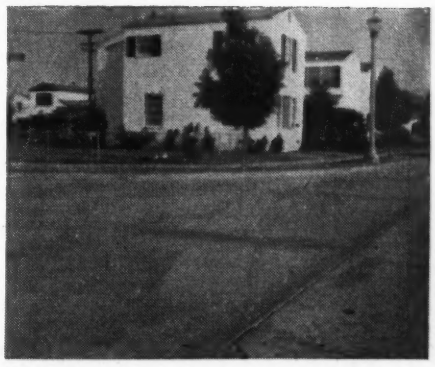
Even with the smoothest saw cut, whether it be 2½ in. deep or only 1 in. deep, when a pavement is entered the structure is being weakened. The joint is the weak link. Inspectors must watch carefully to make certain that this joint is as free of shattering and undercutting as possible.

Further insurance against damage is given by the practice of cutting trenches to a taper. This technique provides a good key to hold the resurfacing material in the patch and in most cases eliminates shattering of the concrete beyond the limits of the patch. It is not necessary to saw-cut at an angle however; by running the stomper down the center line, the operator can cause the cut to break out at a satisfactory taper. Here again, however, an unskilled, careless stomper operator may cause some underbreaking.

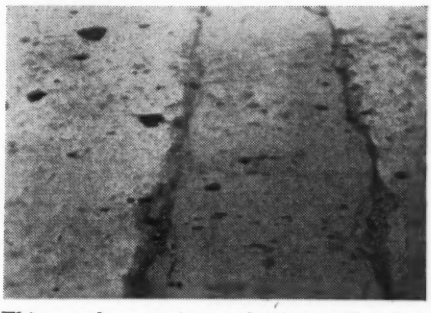
The depth of a saw cut does not, so far as we can determine, make a great deal of difference—within limits, of course. We now require 1½-in. cuts on both streets and sidewalks. We used to require 2-in. cuts, but standards and practice have indicated that 1½ in. is as good for both and seems to be much more commonly specified.

There are instances in which a saw cannot be satisfactorily used. In asphalt it has not proved practical. Irregular edges are in such cases desirable because the action of the traffic in a well-traveled street will tend to knead the edges together into a firm joint. This action is increased if the joint is not too even. Also on concrete streets coated heavily with black top, it is impossible to reach the concrete itself with the saw so we do not require contractors to use saws on such types of paving. Where the top coating is very thin, however, we still insist on saw cutting.

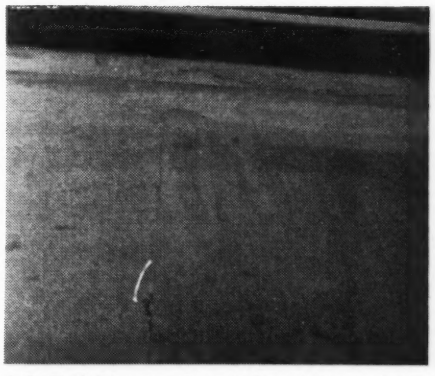
Concrete patches in asphalt, incidentally, give us some trouble. The patch tends to separate at the sides, leaving a gap. At present, we are putting an asphalt seal in some of the older patches to make them water-tight but this is still in the experimental stage, and we don't know as yet whether it is accomplishing much because the cracks are so small it is difficult to know whether or not we are getting good penetration.



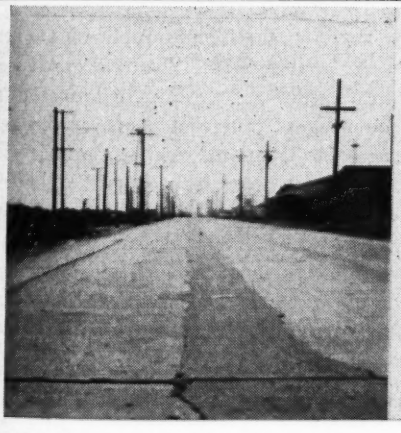
Proof that the saw can be used on a curve is this photo of a telephone company excavation using the pot hole method.



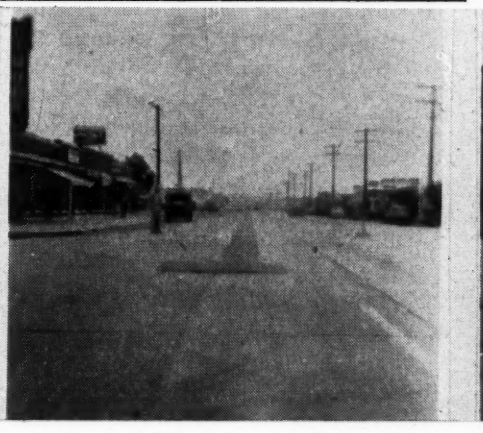
This patch, covering a fairly small hole, is only a few years old, but it will soon have to be replaced.



A bell hole opened and closed by modern methods leaves a clean cut. If the backfill was properly made, this should stand up for a long time.



A jackhammered job with a concrete patch. In addition to the irregular edges, shattering of concrete on either side of the patch is evident. This condition will be intensified with the passage of years.



Saw-cut trench, with finished patch in foreground and temporary patch, used until the backfill settles properly, in the rear. In spite of some careless workmanship, this job is infinitely smoother and better looking than the patch shown in the illustration at the left.

On the same job, workmen experimented with a troweled edge on the cut nearest the curb. The apparent fuzziness along the edge is not a rough cut, as it would appear, but merely spilled concrete which will wear away in time. The troweled edge technique is too new for us to evaluate at this time.

This new glass-fiber pipe is so light that this boy can carry two 10-ft lengths with ease.

U.S. Plywood Develops New Glass-fiber Pipe

THE smooth-looking length of pipe pictured above is a section of Glasweld, a new glass-fiber tube and pipe material developed by United States Plywood Corp. as a replacement for steel. While its value to suppliers of natural gas is still a $64 question, it could mean just about the biggest news of the decade.

Exclusive

In Glasweld, United States Plywood appears to have found a plastic pipe having the properties of metal plus a few additional advantages. Although there is considerable work to be done before full-scale production begins, it is certain Glasweld pipe will be a major answer to corrosion problems that have plagued the piping industry for years. Summing up its overall properties, Glasweld pipe has the corrosion-resistant advantages of plastics and, at the same time, has the high strength of metals with much less weight.

Its tensile strength is approximately 35,000 psi; and it has a Modulus of Elasticity of approximately 3 million psi. Yet, with all its strength, it is only one-quarter the weight of steel. Furthermore, it is made from thermosetting resins and is, therefore, not subject to softening due to heat. It is not brittle like ordinary unreinforced plastic and actually has a higher impact strength than steel of equal weight or thickness.

Early in 1950, the plywood company's new development was officially released for commercial sale. Because production of the pipe was based upon utilizing woven glass cloth reinforcement, its cost was relatively high. Therefore, it was mainly limited to applications in the defense program such as antenna masts, radar booms, insulators, and parts of guided missiles.

Last year, United States Plywood laboratories made a big step toward overcoming the high cost of fabricating Glasweld pipe. A new process was developed which will enable the pipe to be produced directly from glass yarns instead of more expensive cloths. The cost of glass yarns is one-quarter that of glass fabric. In addition, the new process will enable Glasweld pipe to be produced at very rapid speeds in a continuous pipe, thereby taking a big cut out of labor costs. Work is now being conducted on a prototype machine to eliminate some of the variable factors in the new process.

This prototype machine, although not a production machine, will be capable of producing limited amounts of pipe for field tests in new applications. Some of this pipe will be offered for tests in gas lines, since it has the advantages of corrosion-erosion resistance, high strength and light weight.

When work on the prototype machine is completed, the first production machine will be built. It is expected the first production machine will turn out pipe that is within twice the price of steel pipe. This means Glasweld pipe will be competitive with steel, aluminum and other metals where corrosion and maintenance problems exist, or where pipe has to be replaced at least once during its service life.

Initial experiments with the new glass-fiber tubing began about eight years ago in a strange way. During World War II, United States Plywood supplied many miles of plywood tubing to the armed forces for use as antenna masts. Actual experience in the field showed that the plywood tubing was not entirely satisfactory because it could not stand up to extreme weather conditions. Word was sent out to company laboratories to begin work on the development of a new material as a replacement for plywood tubing. Within a short time the company was producing an entirely new material fabricated from woven glass cloths and polyester resins.

In June 1947, the United States Navy gave the plywood company a contract covering a two-year program for the development and evaluation of plastic pipe for shipboard naval use. During the program important methods were developed for fabricating Glasweld pipe, couplings, and fittings. In addition, extensive tests were carried out to prove the material's resistance to corrosion-erosion and fouling. Over the two-year period, Glasweld tubing was found to be corrosion and erosion proof to the effects of weathering, salt and fresh water.

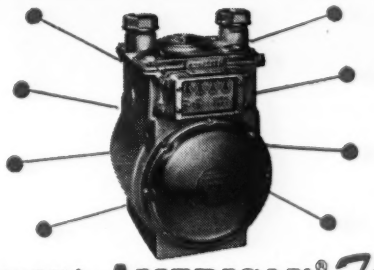
Glasweld tubing used for pipe was found to be resistant to certain concentrations of sulfuric, hydrochloric, nitric, acetic, and other types of acids as well as aromatic and aliphatic hydrocarbons, such as gasoline, oil and other fuels.

Climaxing two years' tests and experiments for the Navy, a trial installation of Glasweld pipe was made at the Kure Beach testing station in North Carolina. After 18 months, the pipe was found to be satisfactory, and an installation of Glasweld pipe aboard a Navy vessel was made in May 1951. During combat maneuvers that followed, the new plastic pipes successfully resisted the effects of severe shock due to constant firing of the ship's guns, while steel pipe installed alongside the Glasweld pipe failed. As a result of this test, the Navy is now installing Glasweld pipe exclusively on a minesweeper. Some lengths of pipe were installed in various chemical processing plants, where tests are continuing.

Early in the development of the new pipe, United States Plywood envisioned the oil and gas producing industries as the biggest potential users of the new material. The company was familiar with the severe corrosion-erosion problems encountered in the extracting and shipping of oil and gas. A research program was designed to prove the pipe's worth in these fields and, also, to determine the material's corrosion and life expectancy.

Near Great Bend, Kan., about 150 ft of 2½-in. upset-end threaded pipe were installed as tail pipe in the bottom of a producing oil well. At the same time, samples of pipe were used in surface lines carrying crude oil and salt water. These actual tests, while still inconclusive, are progressing favorably.

AT LOWEST UNIT COST PER YEAR



Famous AMERICAN® *Firsts*

First with *adjustable tangent* permitting minor adjustments to be made with nuts and set screws.

First with the *two-piece valve box cover* and frame.

First with *cast-in valve seat assembly*, which automatically insures correct *crank bearing*—valve seat relationship.

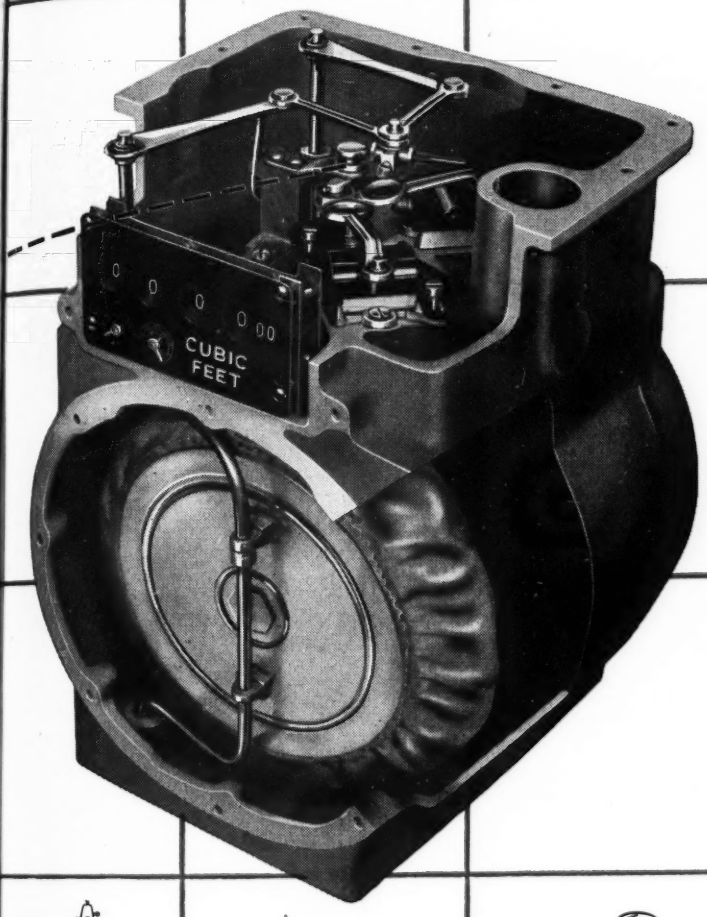
First with *Soldered Seal Index Box*, which has provided a permanently gas-tight index mounting.

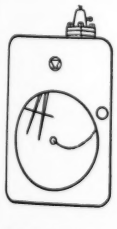
First with *smooth sliding bakelite valve covers* whose design practically eliminates valve noise in thousands of meters now in use.

First with *bakelite valve guides*, which have greatly improved silent guide wire action.

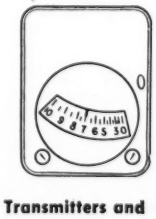
First with *increased capacity* without increasing the size of the case.

First with baffle flange screw, which has prevented meter tampering.

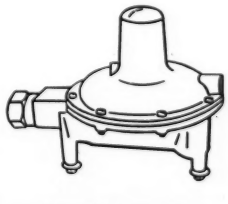




Orifice Meters



Transmitters and Controllers



Liquefied Petroleum Gas Regulators

The efficiency and economy of *American* Meters is backed by more than 115 years of experience and by a constant purpose to provide the finest precision instruments known to gas measurement science.

American is and will continue to be the *first name* in metering dependability—always your *first choice for "Sustained Accuracy at Lower Cost."*

AMERICAN METER CO MEASUREMENT ENGINEERS ®

AMERICAN® METER COMPANY

INCORPORATED (ESTABLISHED 1836)

Members of a professional acting group helped put over the sales message at East Ohio's "Louisiana Breakfast."

East Ohio Uses Professionals To Dramatize Sales Themes

East Ohio Gas Co. launched its newest range sales campaign in dramatic fashion in Youngstown last month by using the professional talent of Dramaturgy Inc. to stage a sales show and "Louisiana breakfast" for its dealers.

The Dramaturgy group was chosen because of its success in the past in dramatizing sales themes for such companies as Cadillac, Westinghouse, General Electric, and American Oil Co. Succeeding shows were put on for dealers in Canton, Akron, and Cleveland and, in all, over 1100 dealers attended the meetings.

Men from the East Ohio Co. worked with Dramaturgy for months prior to the meetings to arrange the program. Instead of the ordinary speeches, dramatic skits and songs were put on by the professional actors to announce the sales contests being sponsored by East Ohio as part of the campaign. A five-piece orchestra, a male quartet, and a chorus of six girls were featured.

In keeping with the scheme of the program, formal invitations and return attendance cards were mailed to all dealers and their salesmen.

The entertainment started after the breakfast with a skit based on the theme, "Which Type of Cook Are You?" (family type, career girl, hostess, gourmet, or continental). The skit showed how today's ranges are designed to meet the requirements of all types of cooks and dramatically offered to the dealers a suggested approach to greater sales.

To demonstrate the contest for salesmen, and the fact that "the salesman is the most important person in the picture," guests were entertained with a musical comedy arrangement based on the song, "Cook His Grub With Gas."

After details of the contests had been announced, the impact of the second phase of the campaign was illustrated in the next skit. Chorus girls came on the stage in concealing clothes and danced through the singing of a song called "No One Will Know It." At the end of the number, as they came to the line, "Display your merchandise," they made their point by removing their dresses and dancing off in sarongs.

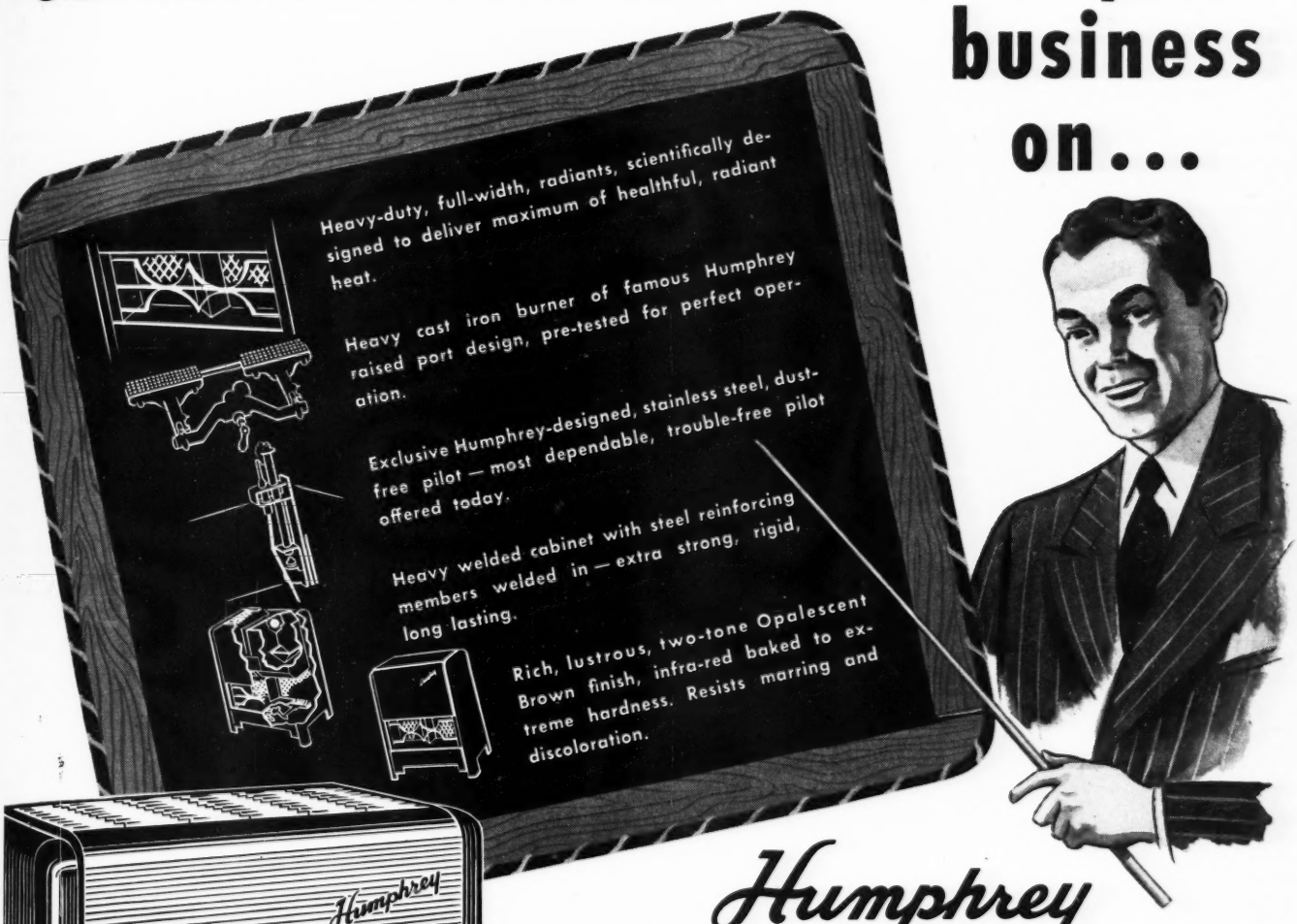
To complete the show, the girls placed name cards on each of the ranges displayed, giving the names of the manufacturers who are backing the campaign. Range manufacturers participating are Caloric, Estate, Grand, Magic Chef, Hardwick, Kenmore, Maytag, Odin, Roper, Sunray, Tappan, and Universal.

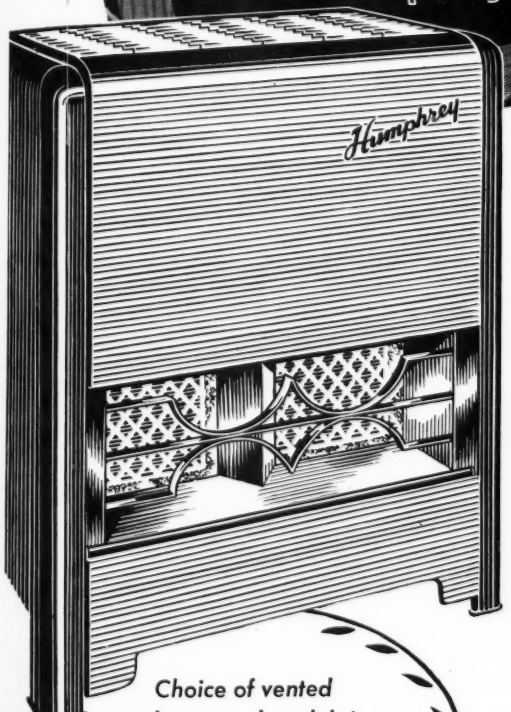
East Ohio is backing up the campaign with point-of-sale material for dealers and an extensive advertising program. Billboards, car cards, spot announcements, and signs on the company's trucks will announce the details of the consumer contest. Ten gas ranges every week will be awarded for the best letters beginning, "I'm glad it's gas for cooking because . . ." Total consumer prizes are valued at over $21,000. In addition, there are prizes for dealers for the best displays and for consumers in each district.

Dramaturgy members ask "Which Type of Cook Are You" in first skit.

Members of the chorus identify participating ranges.

Dealers: Use these 5 GREAT SELLING FEATURES to boost your business on...


Heavy-duty, full-width, radiants, scientifically designed to deliver maximum of healthful, radiant heat.
Heavy cast iron burner of famous Humphrey raised port design, pre-tested for perfect operation.
Exclusive Humphrey-designed, stainless steel, dust-free pilot — most dependable, trouble-free pilot offered today.
Heavy welded cabinet with steel reinforcing members welded in — extra strong, rigid, long lasting.
Rich, lustrous, two-tone Opalescent Brown finish, infra-red baked to extreme hardness. Resists marring and discoloration.



Choice of vented and unvented models in range of sizes, for natural, manufactured, and LP gases.

Humphrey RADIANTFIRE CIRCULATORS

The five important selling features listed above are a reminder of the superb quality built into those Humphrey Radiantfire Circulators that you have on your sales floor. Point out these features to your customers. Show them the brilliant styling and superior construction of these Humphrey Heaters. Explain how this extra Humphrey quality assures them extra years of better heating and lower fuel costs. Year after year, these nationally advertised Humphrey Radiantfire Circulators are among the top-selling appliances in many dealers' stores. You, too, will find that it pays to give them prominent display space, and extra sales attention.

GENERAL GAS LIGHT COMPANY

KALAMAZOO, MICHIGAN

23 Warren Street, New York City — 2nd Unit Santa Fe Building, Dallas — 225 Eleventh Street, San Francisco

NEWS

Miscellany

Radio and TV Used in Gas-For-Northwest Campaign

Leading the fight to bring natural gas to the Pacific Northwest, N. Henry Gellert, president of the Seattle Gas Co., is taking the story to the people of Washington in a series of four radio and television talks in which he reports on the present situation and tells of the importance of natural gas to the development of the region in terms of lower rates for both home and industrial consumers, new job opportunities and power shortage relief.

A public service telecast on Sept. 22 was followed by three successive weekly radio broadcasts on all major networks in Seattle. Neighboring gas companies tie their local stations into the broadcasts either by direct line or by transcription. Over 2500 letters telling about the series were sent to architects, plumbers, heating contractors, appliance dealers, sales executives, builders, civic leaders, etc. Newspaper advertising, including a front page strip, was used to build audiences preceding broadcasts. Outside Seattle, other gas companies promoted listening in their respective areas.

Mr. Gellert, pointing out that the Pacific Northwest is the only section in the U. S. "not dipping into the main stream of natural gas," believes that all citizens are entitled to know the importance to their communities of the FPC's decision on the Pacific Northwest Pipeline Corp.'s application to bring natural gas from the Four Corners area. He gives them the opportunity to join in the fight through their civic organizations and in direct contact with their representatives in government.

In his talk, Mr. Gellert emphasized seven conditions which must be met by a pipeline bringing natural gas to the Pacific Northwest: (1) Gas for a minimum of 20 years. (2 Enough additional gas so the area can have the benefit of cheap gas for many years to come. (3) Pipeline route that can be serviced every day of the year. (4) Service to main cities of the entire Pacific Northwest. (5) Shortest and least expensive route possible under the circumstances. (6) If gas comes from another country, treaty guaranteeing it will cross border without interference and without change in price except by permission of the FPC. (7) Disclosure of all details of contracts between pipelines and producers of gas, all details of engineering costs, etc. to avoid any possible FPC granting of a rate increase because of excessive costs.

Superiority
The superiority of Welsbach-Kitson products is the result of painstaking craftsmanship—of years of experience—of faithful attention to details. All these blend into the creation of a superior line of products with Welsbach-Kitson Quality, Economy and Durability built right into each one. Write now for catalog and price list.
WELSBACH
G-501
Iron Body—Service Pattern with Flat Head
G-515
Iron Body—Service Pattern with Lock Wing
G-308
All Brass—Lever Handle—Roundway Gas Controlled Valve with Single Pilot Tapping
G-308D
with Double Pilot Tapping
G-501R
Iron Body—Service Pattern with Flat Head Key and Recessed Threads
QUALITY • ECONOMY • DURABILITY
The WELSBACH CORPORATION
KITSON DIVISION
1500 Walnut Street
Philadelphia 2, Pa.

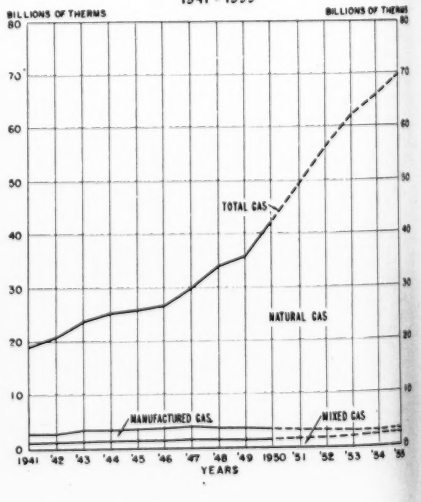
PAD Survey Reveals 40% Expected Rise in Sales

A PAD survey reveals that potential sales of gas are expected to rise 40% in the next five years and go from an estimated 49,700 million therms in 1951 to 69.8 billion in 1955.

Among the major conclusions of the PAD survey are the following:

1. Demands for gas, which rose from 19 billion therms in 1941 to 49.7 billion therms in 1951, are expected to continue to increase steadily to the 69.8 billion therms potential in 1955. The rate of increase was estimated to slow somewhat in 1954 and 1955, however.

POTENTIAL UTILITY GAS SALES
TOTAL UNITED STATES
1941 - 1955



Leader ACROSS THE Nation

EMPIRE

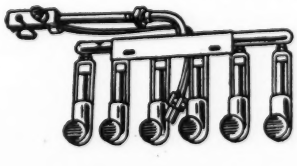
Gas
FLOOR FURNACES

- LEAD IN DESIGN
- LEAD IN ECONOMY
- LEAD IN EFFICIENCY

Heating Engineers and Architects throughout the nation specify Empire Gas Floor Furnaces.

EXCLUSIVE WITH EMPIRE

The FAMED *"Thriftmatic"* *Gas* BURNER



EMPIRE

SEE YOUR LOCAL EMPIRE REPRESENTATIVE OR WRITE DIRECT TO **EMPIRE**

STOVE COMPANY

BELLEVILLE, ILLINOIS

WORLD'S LARGEST MANUFACTURER OF *Gas* FLOOR FURNACES

2. Natural gas will supply increasingly large percentage of the demand and is expected by 1955 to represent 96% of the total gas sales of the nation: natural gas, 66.9 billion therms; mixed gas, 2.2 billion therms; manufactured gas, 700 million therms.

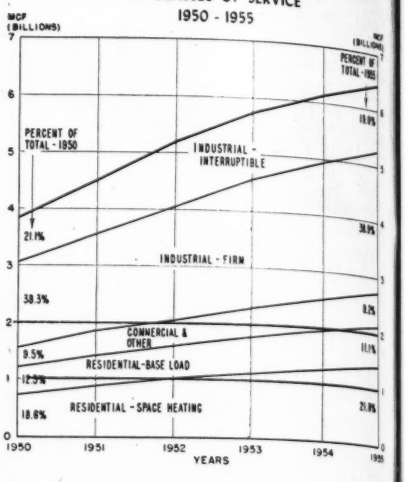
3. Demands for natural gas for residential space-heating are expected to increase at a greater rate than other demands, increasing by 57.4% from 1951 through 1955. Other residential demands are expected to increase by 33.4%; commercial and other, 40.3%; industrial, 41.8%.

4. In spite of the rapid increase in demand for natural gas for residential space-heating, industrial sales will continue to account for the major part of total sales. In 1955 industrial sales are expected to be 57.9% of the total.

Customer estimates stand at 21,733,000 in 1955 compared to the 8,965,000 using natural gas in 1946 and the 18,126,500 in 1952. Manufactured gas customers show a sharp decline from 8,282,000 in 1946 to 3,391,600 in 1952 and to a low of 1,525,900 in 1955. It is estimated that total customers for natural, mixed, and manufactured will reach 26,658,500 in 1955, rising from 19,496,000 in 1946. Residential space heating customers are expected to triple the 1946 figure, rising to over 15.2 million, representing 57.2% of the total.

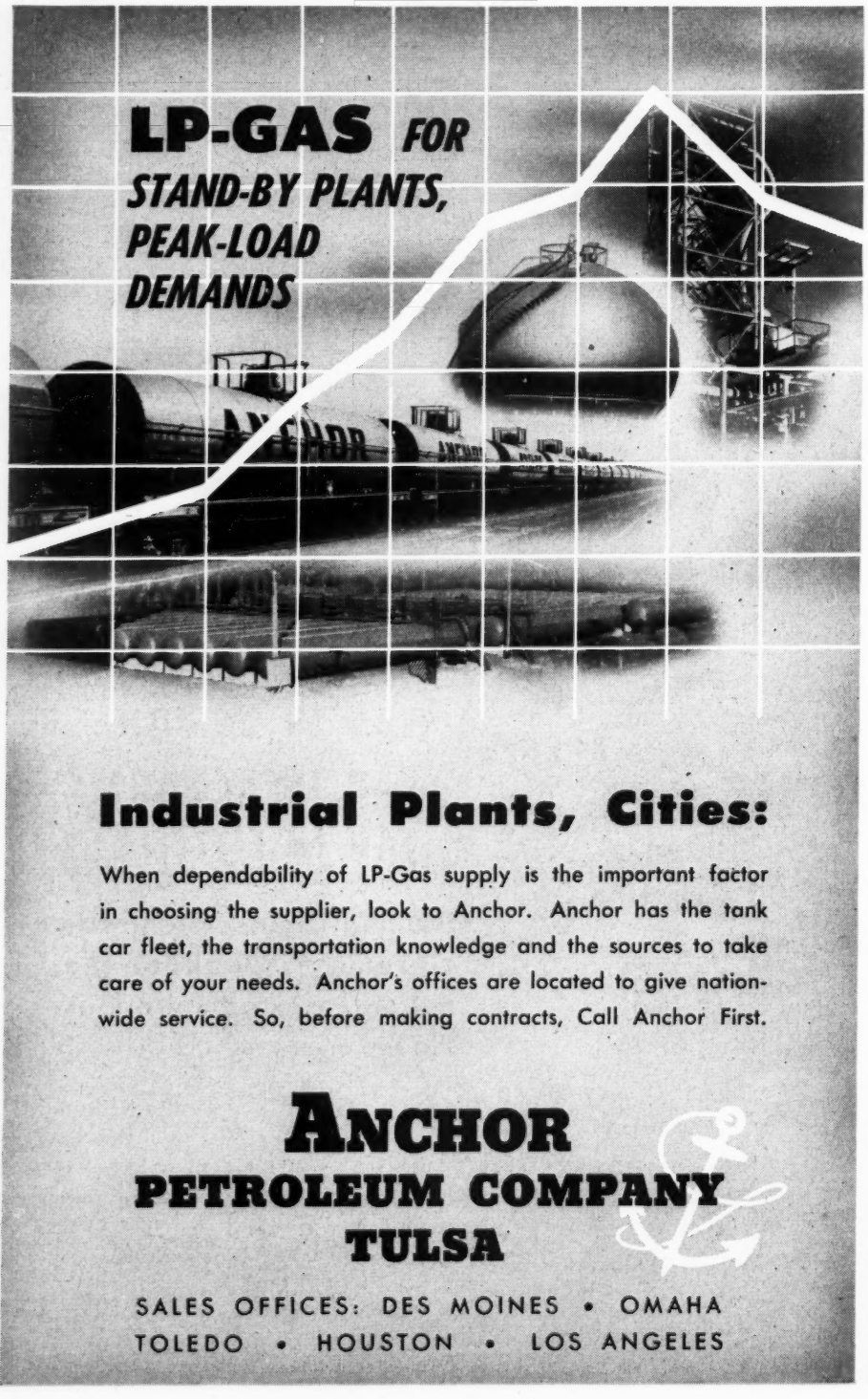
This survey provided the basis for the gas industry's expansion program which has been approved for 1953 by the Defense Production Administration.

POTENTIAL NATURAL GAS UTILITY SALES
TOTAL UNITED STATES
BY CLASSES OF SERVICE
1950 - 1955



In announcing the results of the survey, Howard Noyes, assistant deputy petroleum administrator, said, "We at PAD realize that DPA is in no position to promise that this much steel will be available. We are encouraged, though, by this official recognition that expansion of the industry is essential to fill the nation's defense needs and essential civilian needs.

"The gas industry is the only major industry that has had such short supplies of steel that its market had to be severely restricted, not just since the Korean invasion, but long before. It is essential that the restrictions [on adding househeating customers] be lifted as quickly as possible, but that can be done only if the industry is permitted to expand . . . facilities . . . to transport additional supplies to the market areas."


LP-GAS FOR STAND-BY PLANTS, PEAK-LOAD DEMANDS
Industrial Plants, Cities:
When dependability of LP-Gas supply is the important factor in choosing the supplier, look to Anchor. Anchor has the tank car fleet, the transportation knowledge and the sources to take care of your needs. Anchor's offices are located to give nation-wide service. So, before making contracts, Call Anchor First.
ANCHOR
PETROLEUM COMPANY
TULSA
SALES OFFICES: DES MOINES • OMAHA
TOLEDO • HOUSTON • LOS ANGELES

Annual Report Wins Award

The Portland (Ore.) Gas & Coke Co. has been judged as having the best annual report of the gas industry, according to the final ratings of the independent board of judges of the *Financial World* magazine survey of annual reports. The bronze "Oscar of Industry" trophy was presented to Charles H. Gueffroy, president of Portland Gas, at the annual awards banquet at the Hotel Statler, New York, on Oct. 28.

A total of 5000 annual reports in 100 industrial classifications were considered this year in the competition, the 12th in the series. In the gas category, Consolidated Natural Gas Co., New York, was runner-up for top honors while National Fuel Gas Co., New York, placed third.

PG&E Studies Atom Energy

Atomic energy for industrial use currently is under study by the Pacific Gas & Electric Co. in cooperation with the Bechtel Corp., according to James B. Black, president of the San Francisco utility.

Addressing the annual meeting of the California Manufacturers Assn. in San Francisco, Mr. Black said that the secret project was started in April 1951 as part of the Atomic Energy Commission's program on industrial development of atomic power. He

It's a landslide!

Distributors, dealers and users agree . . .

Hamilton

HAS WON PENNSYLVANIA!

Philadelphia Distributor
Stuart F. Louchheim
rates Hamilton top candidate for the title, 'most-wanted appliance in America'! Says President Louchheim, "The acceptance of Hamilton goes without saying—it's first in dryers!"

Dealer Mort Farr,
of Upper Darby, Pennsylvania, is President of N.A.R.D.A.—really knows how to spot a winner! He's seen what Hamilton promotion and service-free customer satisfaction mean. "Hamilton is tops," says Dealer Farr!

Hamilton gets the all-important women's vote!
Mrs. Rose C. Wilderman
has a family of seven, three children less than six years old. Says drying was a problem but her Hamilton eliminates all weather worries. "It's like a laundress in the house!"

Hamilton - the original automatic clothes dryer is still the people's choice!

Everyone is happier with Hamilton . . . chances are you would be, too! Users know and trust the Hamilton name . . . prefer its many exclusive features . . . tell their friends about Hamilton's simple, speedy, trouble-free operation. Dealers point to profits they make handling the best-known name in the fast expanding dryer field. Hamilton's low, low service cost is money in the bank to them—and they get *more sales help from Hamilton!* In choosing Hamilton, leading distributors get a *complete line* of dryers, the *first* and *finest* in the business.

Why wait any longer to find a profitable place for yourself on this winning ticket? Write today to Hamilton Manufacturing Company, Two Rivers, Wisconsin.

Hamilton
the original
AUTOMATIC *Gas* CLOTHES DRYER

Hamilton Manufacturing Company
TWO RIVERS, WISCONSIN

pointed out that it still is too early to determine whether commercial operation of an atomic energy power generating plant would be economically possible.

Rochester Gas Spends $600,000 for Safety

Since the Brighton disaster, the Rochester Gas and Electric Co. has spent $600,000 in installing safety equipment in its system according to a special report issued to *GAS* last month.

These safety measures include:

1. Construction of reinforced concrete regulator vaults including ventilating facilities.
2. Installation of relief valves after all low pressure regulators.
3. Installation or replacement of old type house regulators with new regulators including mercury seals.
4. Installation of cathodic protection for prevention of pipeline corrosion.
5. Installation of several thousand tamper-proof service cocks in place of old style cocks.
6. Installation of fire-proof supports under all district regulators.
7. Installation of a new type odorizer.
8. Establishment of a leakage survey.

ESPECIALLY FOR YOU!

VALVES, FITTINGS and FUNCTIONAL ASSEMBLIES

Machined Forgings, Extrusions, Castings to exacting customer specifications.... For defense production or essential civilian requirements.

GOT A PROBLEM? Our field engineers and home office Research and Development department will be happy to work with you with no obligation, of course.

DEFENSE—Producers and Suppliers of Ammunition Components for U. S. Army Ordnance. . . . Valves and Fittings for U. S. Navy, U. S. Army Air Force, U. S. Maritime Commission and other agencies demanding *Top Brass*, precision-made components.

CIVILIAN—Producers and Suppliers of Valves, Fittings and other components for the following industries: Air Conditioning • Automotive • Diesel Engines • Farm Equipment • Gas Appliances • Oil Refining and Heating • Plumbing • Refrigeration.

DETROIT BRASS & MALLEABLE CO.
SPECIALTIES DIVISION
DETROIT 9, MICHIGAN

AT YOUR SERVICE IN THE NATIONAL EMERGENCY

Newspaper for Rate Hike

From an editorial in the Paris (Texas) News.

"The Paris News thinks the request [of Lone Star Gas Co., Dallas, for increased rates] should be approved by the council . . . [the request] appears to be reasonable and in line with other rate increases granted public utilities. It is far less, in proportion, than most price increases that are being borne by the buyers of food and other living necessities. . . . The gas company, 10 years ago, reduced its charges because it was able to supply gas at less cost to it than it had been paying. Consumers have had the benefit of that reduction all the 10 years, while prices on everything else were rising."

Newsnotes

Jerome Trichter, assistant commissioner of health in New York City, reported last month that his department has inspected 64,817 apartments since May 1, 1951 and found 26,489 seriously defective gas appliances. Of these, 16,646 were ranges, 6909 refrigerators, and 2884 were water and space heaters. He predicted 50 deaths for the next six months.

There has been a significant drop in fatalities in the past two years, he said, but "gas appliance service still is extremely poor because there are so many incompetent people in the business."

Some coal men fear their new price rises will mean new losses to the gas industry. In July, cement mills burned 10.8 billion cu ft of gas, 10% more than a year earlier, while coal consumption dipped 14% from July 1951, down to 600,000 tons.

Representatives of the gas industry of France, another group sponsored by the Mutual Security Agency, are studying the gas industry in the United States. Last month the group of five engineers studied the operations of the Rochester (N. Y.) Gas & Electric Corp.'s plant.

Manufacturers

Appliance Makers Seek Balanced Metal Supply

Sharply increased demand for domestic and industrial gas equipment continues to pose a materials problem for the gas appliance industry and despite recent signs that the government is relaxing its control over materials, GAMA reports that the allocation of steel and other metals to various branches of the industry still remain "out of balance." Manufacturers of domestic equipment are only "slightly better able" to keep up with demand than they were at the start of the year, according to Louis Ruthenburg, board chairman of Servel Inc. and president of GAMA.

"Apparently there now is a better balanced schedule of defense production," Mr. Ruthenburg said. "This may mean that es-

sential civilian industry can expect more equitable allocations of metal," although, as he pointed out, appliance makers now are confronted by the recent OPS "pass-through" order on steel price increases. Many manufacturers, he said, already have appealed to the OPS for relief from the order.

On the favorable side, Mr. Ruthenburg continued, the industry looks for some impetus from the Federal Reserve Board's suspension of Regulation X, the curb on real estate and home building credit. Another boon to appliance men is the rapid expansion of natural gas pipeline facilities.

RCA Buys Estate Stove Co.

The Noma Electric Corp. and the Radio Corporation of America have announced that negotiations have been completed for RCA's acquisition of the Estate Stove Co. of Hamilton, Ohio.

The acquisition of Estate, a division of Noma, will provide RCA with manufacturing facilities and an organization with skilled workers and experienced management for RCA's entrance into the field of gas appliance manufacture.

Present plans call for the formation of a new subsidiary, the RCA-Estate Appliance Co. Inc., with Cecil M. Dunn, Estate president, becoming president of the new company.

Cecil M. Dunn, president of the newly formed RCA subsidiary (left) shows features of the Estate electric range to Charles M. Odorizzi, RCA Victor operation vice president, and Robert A. Seidel, RCA Victor vice president.

Lab Makes Exceptions

Because of the considerable lapse of time between receipt of manufacturers' requests by the AGA Laboratories to test appliances and listed accessories and the date when tests can be started, a situation has resulted in which manufacturers may not be able to obtain their 5-year renewal of approval by test, or completion of approval of new models by tests, prior to Jan. 1, 1953.

In view of this circumstance, temporary exceptions to the "Application for approval or listing" have been made so that affected manufacturers can continue production under the old approvals for the first six months of 1953, provided they comply with the prescribed provisions. The exceptions apply to all appliances and accessories, except gas conversion burners, tested under the 1941 listing requirements.

Honeywell Enlarges Office

To handle an increasing demand for automatic controls of all types for civilian, military and commercial establishments in northern California, Minneapolis-Honeywell Regulator Co. late in September moved its district sales offices to larger quarters in Sacramento. The Honeywell Sacramento office, headed by James E. Marshall, serves the area bounded by Solano, San Joaquin, Calveras, and Mono counties to the south; Yolo, Colusa, Glenn, Trinity and Siskiyou on the west and northwest, and to the Oregon border on the north. Its territory also includes 11 counties in western Nevada.

Peerless Augments Plant

The Peerless Manufacturing Corp., Louisville, Ky., has purchased a two-story building immediately adjacent to the firm's main building for approximately $135,000. The building, of brick and reinforced concrete construction, contains 75,000 sq ft of floor space. A spur track permits loading of three cars simultaneously and there are dock facilities that can accommodate five or more

For Many Pipeline Jobs, *Only* the Sherman *Power* Digger is Practical

The Sherman Power Digger operates with precise, fingertip control. It swings at a 140° arc with a reach of 10 ft. behind the tractor and 8 ft. below grade.

Get the most out of the pipeline digging equipment you now have by keeping it on your big pipe-laying work.

On maintenance jobs where giant equipment and manual labor are both impractical, use a Sherman Hydraulic Power Digger. It uncovers pipeline quickly—at low cost. You can buy the digger plus the light, rubber-tired tractor to which it is fitted for less than the cost of many automobiles.

For complete information on how the Sherman will cut your pipeline maintenance costs and release your other equipment for big jobs, write today for free descriptive literature J2.

Designed, Engineered and Manufactured Jointly by

SHERMAN PRODUCTS, Inc.
Royal Oak, Michigan

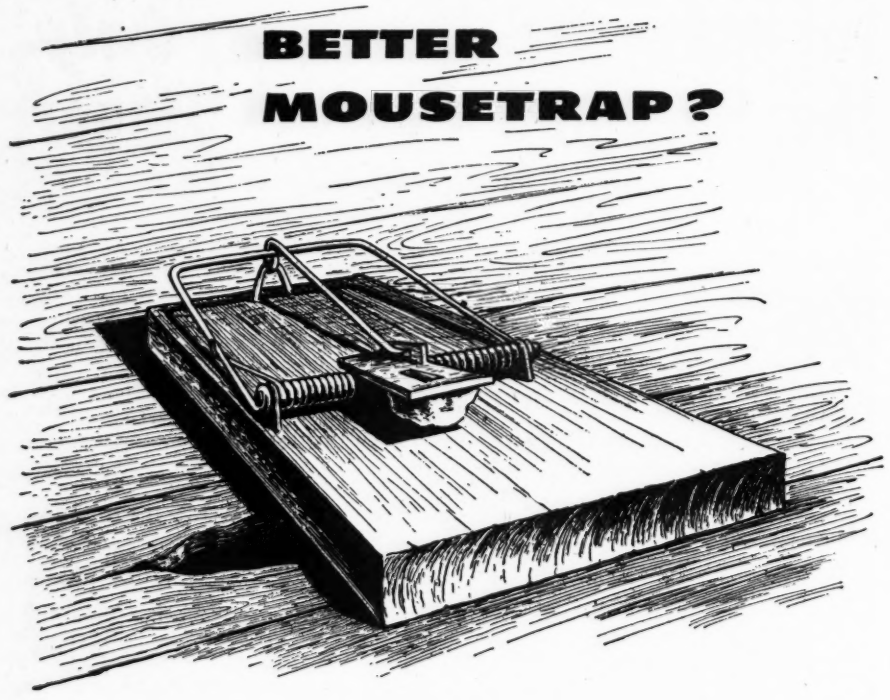
WAIN-ROY CORPORATION
Hubbardston, Mass.

•

Patent No. 2,303,825
Other patents pending

Sherman
PRODUCTS, INC.
ROYAL OAK, MICHIGAN

Billboards throughout southern California recently carried this cartoon by Virgil Partch. It was run as an experiment by SoCal and Southern Counties.



The story of the reward for a better mousetrap is proverbial. But the fact remains that most mice are still caught by this simple, economical and effective contraption.

Gas purification is a parallel case.

Iron Sponge, preferred for the removal of H_2S seventy-five years ago, is still preferred today. And for these same reasons . . . simplicity, economy and effectiveness.

Iron Sponge operates with high efficiency at high or low pressures, has excellent capacity and activity, gives long service between foulings and is simply and quickly regenerated.

CONNELLY Inc.

3154 S. California Ave., Chicago 8, Ill.
Elizabeth, N. J. • Los Angeles, Calif.

trucks. The building will be used for additional manufacturing and local storage of Peerless gas-fired heating equipment and fireplace fixtures.

Eclipse Opens in Canada

A new company, Eclipse Fuel Engineering Co. of Canada Ltd., has been formed to handle sales and service on Eclipse products in Canada, according to the parent company, Eclipse Fuel Engineering Co., Rockford, Ill. Under the management of Gordon E. Bouvier, new offices have been established in Toronto.

The entire line of Eclipse equipment will be represented and serviced by the Canadian organization and, in addition, numerous standard combustion and gas distribution products and components will be locally stocked to speed shipment.

H. K. Porter Buys Company

The H. K. Porter Co. Inc., Pittsburgh, has purchased, for cash, the Watson-Stillman Co. of Rosselle, N. J. in a multi-million dollar transaction, according to Porter President T. M. Evans.

The purchase of Watson-Stillman, manufacturer of steel fittings and hydraulic equipmen, marks another move by Porter to further diversify its operation. The New Jersey firm will operate as the Watson-Stillman fittings division and will continue to be directed by Edwin A. Stillman as president.

Manufacturers Notes

Empire Stove Co. officials announced late last month that hereafter the Belleville, Ill. company will discontinue the manufacture of gas ranges and confine itself to producing gas heating appliances. In addition to its present line of floor furnaces and recessed heating units, Empire will, in 1953, market new suspended, basement, closet, and perimeter type central heating units, together with various types of circulator heaters.

Top Brands Inc., Cleveland, will distribute Cribben & Sexton Co.'s Universal gas ranges in the northeastern Ohio territory, according to a recent announcement. The newly formed company is headed by Matthew Grad, James Shepard, and Alex Kerekes.

Servel Inc., Evansville, has appointed Wholesale Supply Inc. of Portland, Ore. as a distributor for Servel refrigerators and water heaters in a territory composed of most of Oregon and five counties in southern Washington.

Financial

Rate Increase Applications Continue to Pile Up

In a typical rate hearing last month, the Pennsylvania Public Utility Commission was told that the utility seeking higher rates has been operating in the red for the past four months. A spokesman for the Manufacturers Light & Heat Co. made the statement at the opening of a three-day hearing

on the company's proposed $4,245,000 annual gas rate increase. Further, Manufacturers attorney said testimony would show that the company's rate of return for a 12-month period will be only 2% to 3%. Originally, the PUC ordered the rate increase suspended for six months after it was filed to be effective Aug. 1.

In other cases, the FPC suspended a proposed increase in wholesale natural gas rates by Cincinnati Gas & Electric Co. amounting to $127,500 per year, or 14%, for sales to its only wholesale customer, the city of Hamilton, Ohio. In Michigan, the PSC is considering a $6,569,000 a year hike requested by Consumers Power Co. The company's original request, made early in the year, was for $5,828,000.

The Rio Grande Valley Gas Co., Brownsville, Texas, has been granted a rate increase averaging about 21% by 20 cities and towns which it serves and by the Texas Railroad Commission. In contrast to the large number of requests for higher rates, the New Jersey Natural Gas Co., Asbury Park, is seeking to lower its rates for natural gas. The decrease, which would reduce anticipated annual revenues by about $250,000, would result through a standardization of rates for different types of customers.

Lone Star Completes Loan

Lone Star Gas Co., Dallas, last month completed a $110 million loan with the Prudential Insurance Co., described as one of the largest ever closed in Texas.

Proceeds from the new loan will be used to retire outstanding loans, help finance a continuing expansion program, and augment working capital until additional revenue is realized under a current system-wide program seeking increased rates.

Eighty-five million dollars will go toward retirement of all presently outstanding funded debt and part of the remaining $25 million, combined with revenue derived from operations, will be used for reinforcements and additions to physical properties throughout the company's territory in Texas and Oklahoma.

Crocker Asks Rate Relief

Some commissions charged with regulating the natural gas industry "seem to ignore" the future needs of natural gas consumers, Stuart M. Crocker, chairman of Columbia Gas System, Inc., told members of the Society of Security Analysts at a recent meeting. Asserting that some groups seem to believe their only purpose is to set the lowest possible rates at the present time, Mr. Crocker believes that the authorities are ignoring their future responsibility to make certain that public utility companies remain healthy financially. The processes of authorizing rate increases "must be speeded up and rate relief, even though on a temporary basis, must be granted as soon as the increased costs materialize."

July Revenues Up

Operating revenues of natural gas companies reported to the FPC totaled $112,694,771 in July 1952, an increase of 10.7% over last July's receipts. For the 12 months ended July 31, revenues were up 16.7%, aggregating $1,747,606,960 compared to

THE NORMAC BELL JOINT CLAMP

A SIMPLE SOLUTION for one of the GAS INDUSTRY'S *most trying problems*

Solves Your Joint Repair Problems • Quick • Easy • Permanent

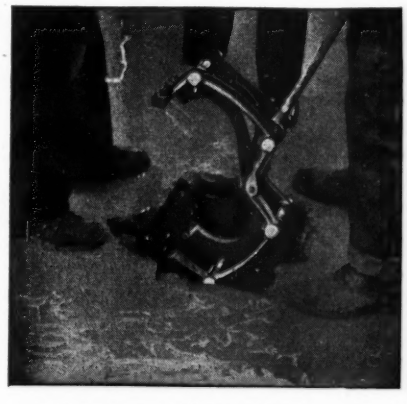
Installed in small pavement openings. Available in all standard sizes from 3" to 12". A simple set of tools cleans the joint, installs the clamp . . . often in only a quarter of an hour. SAVES TIME. SAVES MONEY and the repair is permanent. Designed for all conditions particularly where pavement repair costs are prohibitive. Such small opening repairs are scarcely noticeable when pavement is replaced.

Normac Clamps can be installed in large as well as small openings.

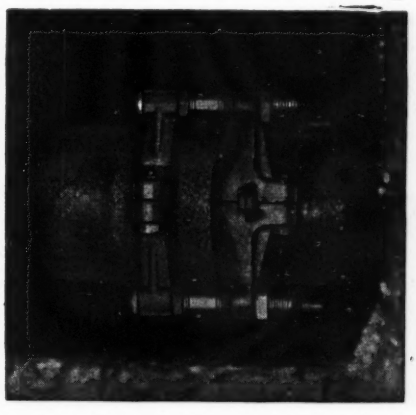
Norton-McMurray hold definite leadership in the development of methods for installation and rehabilitation work through small openings. We welcome the opportunity to help solve a problem you may have—tell us about it.

Write for our catalog describing our complete line of

COUPLINGS . . . FITTINGS . . . SERVICE TEES and ELLS . . . SLEEVES . . . COMPRESSION-END COCKS . . . METER BARS and BRASS FITTINGS for copper pipe.



6 inch Normac Clamp being lowered into hole for installation



6 inch Normac Clamp in service after installation

NORTON-McMURRAY MFG. CO.

122 SOUTH MICHIGAN AVENUE • CHICAGO 3, ILLINOIS

Method and product covered by U. S. Patents, Nos. 2,163,261 and 2,178,286.

the $1,497,905,381 of last year.

Gas sales to ultimate consumers during the month were 163,739 MMcf, an increase of 4.2% over July 1951. Sales to residential, commercial and industrial consumers increased 2.5%, 4.9%, and 3.3%, respectively, while revenues from the three classes of service increased 5.9%, 7.4%, and 4.5%, respectively.

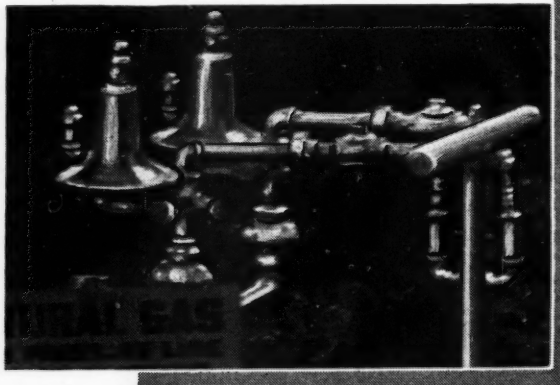
Financial Notes

Following approval by the SEC, the board of directors of United Gas Improvement Co., Philadelphia, late in September also approved the merger into UGI of all of its utility subsidiaries: Allentown-Bethlehem Gas Co., Consumers Gas Co., Harrisburg Gas Co., Lancaster County Gas Co., Lebanon Valley Gas Co., Luzerne County Gas & Electric Co., and the Philadelphia Gas Works Co. It is planned that the merger will become effective Dec. 31, 1952.

Sales of gas by utilities to ultimate customers in August totaled 3,316,000 therms, a gain of 3.2% over the 3,213,000 therms in the like month last year, according to an AGA report. During the 12 months ending August 31, utility sales of gas rose to 50,-101,000 therms, a gain of 8% on the 46,-383,000 therms in the comparable period last year.

The Washington (D. C.) Gas Light Co. is seeking to acquire the franchise and properties of the Prince Georges Gas Corp. and the Washington Gas Light Co. of Maryland, two subsidiaries now serving Prince Georges and Montgomery counties, Md.

A WIDER RANGE
... of Delivery Pressure Control



REYNOLDS HIGH PRESSURE LINE REGULATORS in parallel hookup have an increased range of capacity as well as a wider range of delivery pressure control. This also provides greater margin for emergencies. On inlet pressure the range is up to 650 pounds. For outlet pressure, this unit assures absolutely accurate and dependable control from 2 to 100 pounds. This variance in outlet pressure is made by use of different sizes of diaphram cases and further flexibility in the spring type is possible by use of different strength springs.

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H. D. "MIKE" MEUFFELS
423 Dwight Building
Kansas City, Missouri

SEIDENGLANZ & CO.
2nd Unit, Santa Fe Building
Dallas, Texas

REPRESENTATIVES

EASTERN APPLIANCE COMPANY
Boston, Massachusetts

WALDO S. HULL
163 W. Queen Lane
Philadelphia, Pennsylvania

Reynolds Gas Regulator Co.
ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

Sales and Promotion

Milwaukee Gas and Dealers Rounding Up Old Ranges

The Milwaukee Gas Light Co. has gone all out on a cooperative plan for dealer participation in the Old Range Roundup. The program includes billboards, car cards, newspaper ads, radio and TV programs, mailing pieces, customer and dealer prizes, and a dealer dinner. Running from Oct. 13 through Nov. 30, the campaign got under way on Oct. 8 with the dealer-utility "kick-off" dinner.

As part of the program, Milwaukee Gas has posted a full showing of 64, four-color billboards and 1120 car cards within its service area with the imprint "gas company or your dealer." In addition, participating dealers were provided with billboard sheets and car cards imprinted with their names. The utility's regular radio and television programs feature the Old Range Roundup and have been augmented by 80 radio spots on Milwaukee stations telling listeners about the 25 ranges to be given away. Forty thousand direct-mail pieces were sent to customers in areas where the replacement market is high. Worded to direct the prospective customer to his favorite dealer, the pieces contained all participating dealers' names. The Milwaukee company is also cooperating on all authorized dealer newspaper advertising, paying 25% of such authorized advertising, providing mats of various widths, and conducting its own large newspaper campaign.

In the customer contest, anyone with an old range is eligible to enter. The gas company will reimburse the dealer the retail price of the gas ranges won by his customers. Dealer contests, carrying awards of $500 each, are for the best window display and the best floor display.

Regional Ad Campaign Has 103 Participants

A three-fold cooperative advertising and promotional program, believed to be one of the biggest coordinated campaigns ever, is now operating in eastern Pennsylvania, building sales and prestige for the gas industry, reports *Printers' Ink*.

The objects of the campaign are to (1) promote the theme "Gas Is Best"; (2) obtain support of dealers and appliance manufacturers in building sales, and (3) increase the sale of gas through utilities and the L.P. gas industry. The program is unusual in several ways:

First, its size is impressive. It includes 23 utilities, 53 LPG producers and dealers, 19 appliance manufacturers, and 8 equipment suppliers. Secondly, the program is completely voluntary. It is supported by gas industry members of eastern Pennsylvania who signed up after seeing the comprehensive promotion program prepared at the request of the gas sales promotional committee of the area. The initial budget is $90,000.

As a result of the apparent success in-

dicated by increased appliance sales, additional participants have been joining in the program all during the 1952 campaign. Others have provided in their budgets for support of the 1953 campaign. It is planned that with this increased enthusiasm as much as $150,000 can be scheduled next year and extended further later.

Regulation

More Gas, Easing of Law Permit Customer Expansion

With the availability of additional quantities of gas and the easing of PAD Order No. 2, thousands of customers are being added to company rosters.

Northern Natural Gas Co., Omaha, plans to release enough additional gas to take care of at least 20,000 house heating jobs in the territory it serves — Minnesota, Nebraska, Iowa, South Dakota, and Kansas. As a result, the Minneapolis Gas Co. says it is ready to supply gas for heating to 18,000 additional customers, bringing to 38,000 the number of permits for gas heat released by the company in 1952. Of the 40 MMcf per day Northern is planning to make available, Minneapolis Gas will get 12 MMcf.

Other areas and companies affected include 22 gas companies in Ohio, among them Cincinnati Gas & Electric Co. and Dayton Power & Light Co., making a total of 35,877 additional space heating installations possible. In Kentucky the public service commission eased its restrictions with the 50 MMcf of gas now coming in from Texas to be augmented in December by an additional 20 MMcf. The Union Light, Heat & Power Co. in the north, the Central Kentucky Natural Gas Co. in central Kentucky, and the United Fuel Gas Co. in the east will be permitted to take on approximately 2700 customers.

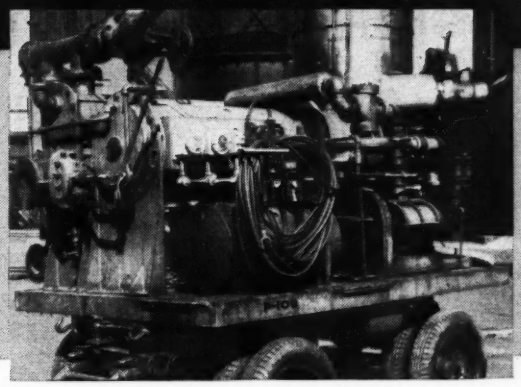
In the east, PAD has granted modifications of its limitation order to the following: The Syracuse (N. Y.) Suburban Gas Co., 350 new customers; Southport Gas Co., Elmira, N. Y., 15 new customers; Bath (N. Y.) Electric, Gas & Water Systems, 150 customers; City Gas Co. of New Jersey, Flemington, 200 additional customers.

Battle Looms in Washington Over Utility Control

According to a Seattle (Wash.) *Post-Intelligencer* reporter, a battle of public vs private control of utilities is in store over the distribution of natural gas when it comes to the state of Washington.

It is reported that an engineering firm from Baton Rouge has been quietly negotiating with towns and cities in the state for municipal construction and operation of the distribution systems. Tentatively, at least, the engineers have obtained the signatures of several communities. Already these communities have filed notice of intervention with the FPC saying that they wish to be heard when hearings are resumed to determine which of the big competing pipeline companies will bring natural gas to Washington, either from Canada or the Southwest. Another firm, from St. Paul, Minn., is reported to have signed seven or eight other communities.

GUARD AGAINST EXPLOSION with R-C INERT GAS GENERATORS



Portable R-C Inert Gas Generator used for purging operations and stand-by protection in large gas-producing plant. Capacity 15,000 cfh.

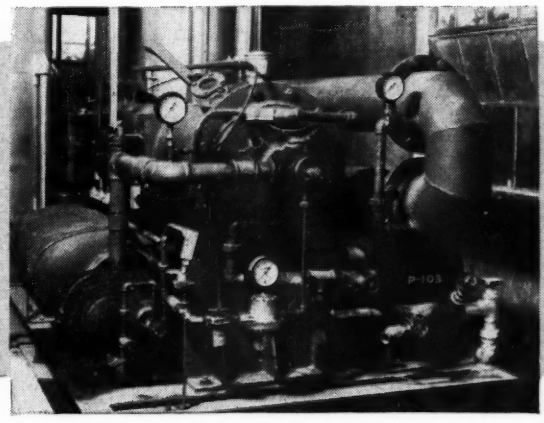
If your operations involve materials or processes which might cause an explosion-produced fire, you can reduce the risk with R-C Inert Gas Generators. In many instances, the relatively small cost is absorbed by savings in insurance costs.

These mobile or stationary units instantly produce a continuing flow of inert gas, for use in purging gas or liquid lines, blanketing dangerous areas and for many other industrial uses involving the handling or storage of explosive materials.

R-C Inert Gas Generators are compact, simple and inexpensive to operate, with either oil or gas as fuel. They are available in capacities from 1,000 cfh to 50,000 cfh, with characteristics to match specific requirements.

Where even a relatively low explosion hazard exists, one incident might produce a disastrous fire. Ask for details on how such dangers may be averted with R-C Inert Gas Generators.

ROOTS-CONNERSVILLE BLOWER DIVISION
526 Oregon Avenue, Connersville, Indiana



Installation of three R-C Inert Gas Generators similar to this one helped one large plant save $6,000 per month insurance premiums, as well as substantially reduce danger of production losses caused by explosion or fires. Capacity of each unit, 6,000 cfh.

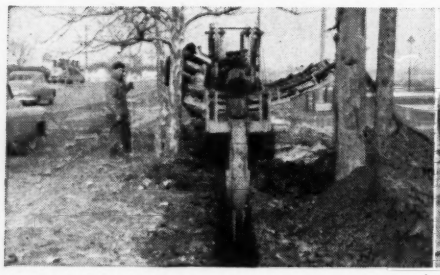
REG. U. S. PAT. OFF.
ROOTS-CONNERSVILLE BLOWER
BLOWER BUILDERS SINCE 1854
A DIVISION OF DRESSER INDUSTRIES, INC.

More for your budget dollars

CLEVELANDS ®

They have a 30-year record of delivering more trench...in more places...at less cost

You can depend on CLEVELANDS for steady production because they're built *tough*. They're compact and maneuverable, with a wide range of trench sizes and digging speeds. You *profit more* because you *do more* at *less cost* with CLEVELANDS!



Tough frost and tight quarters were profitably overcome by this CLEVELAND.

100% machine digging on this house service with a compact, maneuverable CLEVELAND.

THE CLEVELAND 80 WITH JUST 1 MAN DOES 3 BIG TRENCH-COMPLETION JOBS

...lays pipe...

...fills trench...tamps fill...

The CLEVELAND 80 saves you time, work and money on all your trench completion jobs. It fills, tamps and travels simultaneously, handles pipe, does all types of side crane work. Backfills from either side of trench, tamps from side or straddling trench—fast, clean, smooth.

...and does a thorough clean-up job.

Get the full CLEVELAND Story from Your Local Distributor

Pioneer of the Modern Trencher

THE CLEVELAND TRENCHER CO.

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PEOPLE

In addition to his duties as a director and vice president of Niagara Mohawk Power Co., GUSTAV F. WATTERS has assumed the administrative functions of the retiring vice president, John L. Haley. Mr. Watters began his service with the system in 1935 in the appliance service department at Buffalo. Announcement has also been made by Niagara of the appointments of THEODORE C. MORGAN as general superintendent of all gas operations and JOHN Y. ANDREWS as general supervisor of safety work.

Elected to the post of assistant treasurer of Southern Union Gas Co., Dallas, is BAY F. WOMBACHER, former auditor of the company. He will have over-all supervision of Southern Union's general and field office accounting functions. FRANK D. HERNIGAN has been promoted from statistical and budget director to general accounting supervisor.

F. D. Hernigan

B. F. Wombacher

Recent changes at Rheem Manufacturing Co., New York, include the appointment of MAURICE A. STRAUB as assistant national sales manager of heating equipment. He will be concerned primarily with correlating sales and sales promotional activities of distributors and dealers into the company merchandising program. LOUIS C. BALL has been named acting regional manager of the Houston, Texas operations of Rheem while PARR KRUMB has been appointed works manager of the Houston plant.

F. H. EBBERT has been appointed vice president and general sales manager of Gustin-Bacon Manufacturing Co., Kansas City, Mo. In this capacity he will have charge of the company's four sales divisions —glass fiber insulation products, industrial, railroad, and automotive. Mr. Ebbert has been vice president and sales manager of the automotive division since 1946.

Newly appointed West coast district manager for the Davey Compressor Co., Kent, Ohio, is GEORGE E. JENNINGS. Headquartering in San Francisco, Mr. Jennings will be in charge of company operations in California, Oregon, Washington, parts of Nevada, the Yukon territory in Alaska, and the Province of British Columbia in Canada.

WILLIAM R. WALLIS of Wildwood, N. J., has been appointed manager of the Southern division of the New Jersey Natural Gas Co., in an area which includes Wildwood, Ocean City, and the Cape May section of New Jersey. Starting as a meter

reader with Jersey Central Power & Light Co., Mr. Wallis has held various positions including district manager, division manager, and more recently superintendent of operations.

K. E. Schmidt

R. R. Paulin

In two recent appointments by the Michigan Consolidated Gas Co., Detroit, ROLAND R. PAULIN was made manager of operations and KARL E. SCHMIDT was made engineer. Mr. Paulin, a vice president of the company, has served as its engineer since last February, and formerly was chemical engineer, general foreman of the manufacturing department, heating engineer, assistant to the sales manager, supervisor of industrial sales and assistant manager of operations. Mr. Schmidt was previously assistant engineer.

RAY A. NEWBOLD of Uniontown, Pa., has been appointed assistant employee relations director of the Pittsburgh group, the Columbia Gas System. Succeeding him as manager of the Manufacturers Light & Heat Co.'s division in Uniontown is HARRY L. BROCIOUS, superintendent of maintenance and construction for the company at Wheeling, W. Va.

W. R. BIGELOW has been named district gas superintendent of the Joliet, Ill. section of the area served by the Public Service Co. of Northern Illinois. RANDALL A. LIGHTBODY has been appointed western division industrial relations manager, succeeding D. T. WABY, who has transferred to the industrial relations department staff in the general offices.

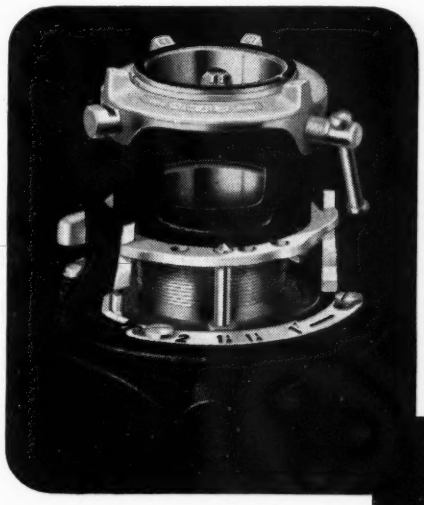
The Consolidated Gas Electric Light & Power Co. has named J. RUSSELL SCHULTHEIS as assistant to the vice president. He will headquarter at the company's Baltimore office.

The Peoples Natural Gas Co., Pittsburgh, has announced the appointment of JOHN S. MCELWAIN as assistant general sales manager. He has been sales promotion manager.

ALLEN A. BARNHART, who has been in charge of Cribben & Sexton Co.'s Cleveland, Ohio sales office, has been appointed director of sales and service for all of Ohio. TOM HERATY, service department manager of the Chicago firm since 1950, has been transferred to sales in New Jersey. Replacing him in the service department is C. S. BUHMAN.

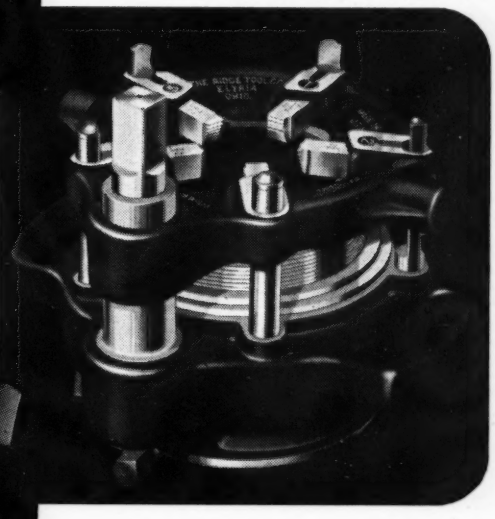
The following changes have been made in the organization of the gas operating department of the Public Service Electric & Gas Co., Newark, N. J.: CONRAD SCHUCK, made

For *Extra* Fast Easy Smooth Pipe Threading Choose RIDGID



Work-Saver Die Stocks

JAM-PROOF 65R
Perfect threads on 1" to 2" pipe with 1 set of 4 high-speed steel dies—sets to pipe size in 10 seconds. Lead screw on barrel won't jam on workholder—drive plate automatically kicks out driving pawl. Self-centering workholder sets instantly!



4P GEARED THREADER
For 2½" to 4" pipe. Balanced loop handles—easy to lift 4P where you want it. Mistake-proof workholder sets to size before put on pipe—1 set screw. Safe enclosed gear. Practically no upkeep. Special 4P for conduit.

OOR RATCHET THREADER
For ⅛" to 2" pipe. Heads snap into ratchet ring from either side, won't fall out. Precision-cut alloy dies reverse for close-to-wall threads. 00R and 0R, ⅛" to 1"; 111R and 11R, ⅛" to 1¼"; 12R, ⅛" to 2". Conduit dies, too.

EXTRA VALUE
RIDGID's are famous for efficient design, smooth performance, rugged durability. Every die stock factory tested. For top value for your money, buy RIDGID threaders from your Supply House.

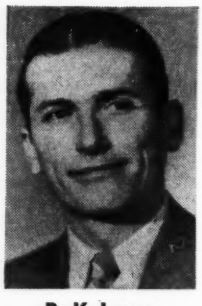
THE RIDGE TOOL COMPANY • ELYRIA, OHIO

RIDGID
Work-Saver Pipe Tools

engineer of distribution, Essex division, succeeding JAMES N. KILLGORE, who has retired after 41 years with the company; DONALD K. HOWE became assistant engineer of distribution, Essex; KIMBER DE HART is superintendent of distribution, Orange-Montclair district; JAMES M. LANE, superintendent of distribution, Ridgewood-Pompton districts; and ROBERT H. REINAUER, assistant superintendent of distribution, Orange-Montclair district.

STANLEY J. PACHYN has become general sales manager and HERMAN WILLIAMS becomes service manager and assistant sales manager in the Dutton boiler division of Hapman-Dutton Co., Kalamazoo, Mich.

Mueller Co., Decatur, Ill. has announced three promotions in its sales division. ROBERT H. MORRIS, formerly sales manager, has been named general sales vice president. ROBERT K. LEVEY, former promotional sales engineer, has become general sales assistant vice president. ROBERT P. JETT has been promoted from salesman in the Los Angeles area to director of sales planning.



R. K. Levey

R. P. Jett

R. H. Morris

DONALD W. DAILEY, after serving for two years as product manager for Servel Inc., has become vice president of the Evansville, Ind. firm. Mr. Dailey holds more than 35 design and mechanical patents in the appliance field.

A territory composed of Ontario, Quebec, New Brunswick, and Nova Scotia will be covered by LLOYD I. BROWN, London, Ont., as field service representative for the Timken Silent Automatic Division in central and eastern Canada. Since 1949 Mr. Brown has been a Timken dealer in London.

RICHARD V. WAYNE will retire this fall as secretary-treasurer of the Tampa (Fla.) Gas Co. He first served the company as chief accountant, later becoming assistant secretary and treasurer.

RONALD P. O'HANLEY has become assistant to the manager of the Malden (Mass.) and Melrose Gas Light Co., Arlington Gas Light Co., and the gas operations of Suburban Gas & Electric. He joined Malden in 1927 as refrigerator sales manager, later becoming sales supervisor. In 1948 he was made director of public relations and has recently been personnel director for the New England Electric System companies in the Mystic Valley area.

Announcement has been made of the appointment of ROBERT W. MCKINNEY as Abilene division appliance service supervisor for Lone Star Gas Co. He will be in charge of employee training on installing and servicing all types of gas burning equipment in an area of more than 90 towns comprising the company's west Texas distribution territory.

WARREN M. REESER, past vice president of Amere Gas Utilities Co. in Beckley, W. Va., has been named special representative for United Fuel Gas Co.'s tri-state area with headquarters in Huntington. S. W. WOODYARD succeeds Mr. Reeser in Beckley and has been named acting manager for Amere.

EMMETT F. CARY, who has been district sales manager of the coupling department of Koppers Co. Inc., Pittsburgh, has been named district sales manager for the company's entire metal products division. With headquarters in Pittsburgh, his territory will include western Pennsylvania, West Virginia, and part of Ohio.

Newly appointed sales manager, eastern division, of Shell Chemical Corp. is G. W. HULDRUM JR. It has also been announced that V. C. IRVINE has become western division sales manager. Mr. Huldrum replaces J. G. FRYE, who has resigned, while Mr. Irvine replaces Mr. Huldrum. In his new position, Mr. Huldrum will supervise

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CONTROLS BLENDING OF TWO OR MORE FINISHED PRODUCTS
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This new instrument serves to determine and record the specific gravity of liquids in the same manner as the standard Arcco-Anubis liquid gravitometer.
*In addition to these features, a controlling mechanism is provided, which may be pre-set to operate the pipe line, refinery, still and plant control valves to any specific gravity range required in blending two or more finished products.
Temperature corrected, this extremely accurate instrument is adaptable to high pressures and is available with internal parts of stainless steel for use with corrosive liquids. Send for bulletin No. 111 A.
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all sales activities east of the Rocky Mountains for Shell's solvents, resins and plastics, and industrial chemicals from his offices in New York City. Mr. Irvine, with headquarters in San Francisco, will head sales activities west of the Rockies.

CARRINGTON MASON has become executive assistant to the president and executive vice president of the Houston Natural Gas Co. Formerly, Mr. Mason was special assistant to the chief executives and then became acting general sales manager.

JOHN N. PORTER has been named merchandise supervisor for the Gas Service Co.'s Kansas City, Mo. division. He has been a representative for the company in Independence, Mo. since 1948.

A. B. BROWN, Southern Indiana Gas & Electric Co., Evansville, has been named executive vice president and general manager and elected a director. F. B. CULLEY, president of Southern Indiana, continues as the chief executive officer of the company.

New officers and directors of Southwestern Development Co., New York, include GEORGE BAIRD, formerly executive vice president, named president, succeeding P. C. SPENCER, resigned. Three new directors are ROSS D. ROGERS, GEORGE W. DUPREE, and THOMAS F. CARTWRIGHT.

WALTER A. WOOD, past manager of Central Kentucky Natural Gas Co.'s Lexington district, has become manager of distribution for the Columbia Gas system affiliate . . . After serving 16 months with the OPS in Washington, MURRAY D. SMITH has returned to Public Service Co. of Northern Illinois, Chicago, as assistant to the executive vice president.

FRED R. RAUCH, vice president and director of industrial relations of Cincinnati Gas & Electric Co., is presenting a management seminar under the Mutual Security Agency's technical assistance program in Austria . . . The newly created position of operations controller of Northern States Power Co., Minneapolis, has been assumed by G. F. JOHNSON, a 25-year veteran in the company's rate and research department . . . Recent United States Steel Co. appointments included naming HERBERT J. WATT as assistant vice president, sales, western area; F. ROYAL GAMMON, assistant vice president, sales, eastern area; L. L. LEWIS, general solicitor; and A. L. MULLING, MERRILL RUSSELL, and R. HEATH LARRY, assistant general solicitors.

WALTER GESELL, vice president in charge of operations for the Oklahoma Gas & Electric Co., Oklahoma City, has been elected president of the Oklahoma safety council . . . New manager of marketing of the General Electric Co.'s home heating and cooling department is R. C. ROBERTSON, formerly manager of direct sales for the company's air conditioning division . . . N. C. HAYS has become west central district manager for the Davey Compressor Co., Kent, Ohio. His territory will include New Mexico, Arizona, Utah, Colorado, Wyoming, Idaho, Montana, part of Nevada, and the provinces of Saskatchewan and Alberta . . . New assistant vice presidents of Columbia Gas System, Pittsburgh, are JAMES E. COLEMAN and GERALD E. WILSON.

Obituaries

A. B. Paterson

ALBERT B. PATERSON, chairman of the board of New Orleans Public Service Inc., died recently. Mr. Paterson first entered the utility field with the Meridian (Miss.) Light & Railway Co. When New Orleans utilities were organized as NOPSI, in 1922, he became vice president and general manager of the company. He was named president in 1930, holding that position until May 1951 when he was re-elected chairman of the board and succeeded by George S. Dinwiddie as president.

ELMER S. STACK, well-known New England consultant on hot water supply systems, died Sept. 28 at the age of 82. Mr. Stack was the inventor of the novel multiple, small tube, gas-fired side-arm water heater. In later years he served as a consultant for gas utilities on matters of hot water supply.

HAROLD L. GAIDRY, principal gas engineer for New Orleans Public Service Inc., died Sept. 27 in a New Orleans hospital. He was 54 years old. Mr. Gaidry joined NOPSI in 1924 in the railway department, later moving to a prominent position in the company's gas department. He had served in the AGA as chairman of the distribution committee and of the technical section.

H. A. MASON, assistant to the manager of laboratories with the General Petroleum Corp., Los Angeles, died Oct. 7. He was 58 years old.

THERE'S NO INSURANCE POLICY TO PROTECT
YOU AGAINST Pilot Outage–
Actual Size
BUT THERE IS OUR NEW PRODUCT–
MAXITROL RV-10-⅛" PILOT REGULATOR
Nope! No such paper insurance available, but there IS our new Maxitrol RV-10⅛" Pilot regulator which assures efficient, accurate pilot operation regardless of fluctuating pressure conditions, and in addition, materially cuts wasteful costs on service calls and loss of customer good-will. Only slightly larger in diameter than a silver dollar, it offers more than a jumbo-size stack of bank notes in ultimate savings!
Immediately available for all Gas Fired Appliances including: Boilers, Furnaces, Conversion Burners, Hot Water Heaters, Ranges, etc.
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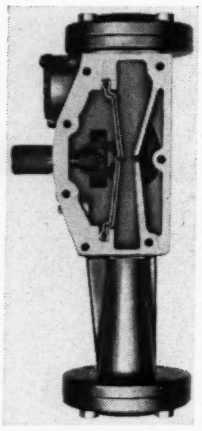
New Products and Trade Literature

To secure further information on products or new literature, simply fill out the coupon and mail, indicating by number the information or literature needed.

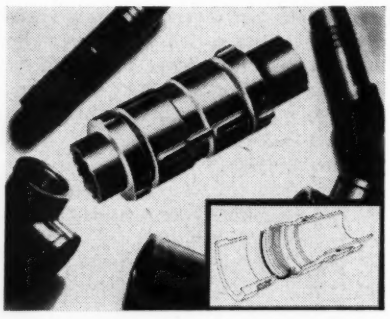
1 Vari-Set Mixer



Changing heating loads on combustion equipment is now simplified by a new Vari-Set mixer, according to engineers of the Eclipse Fuel Engineering Co. A built-in, adjustable orifice eliminates replaceable jets and changes volume of automatically proportioned gas and air for any Btu output within the capacity of various sized mixers used in furnaces, ovens, kilns, and other combustion equipment. Gas entrained by the air stream is automatically proportioned to form a mixture that gives perfect combustion at all heating loads. A metering valve regulates the pressure for operating control equipment and for burning mixed, natural, or L.P. gas.

Advantages can be seen in many industries where heating equipment is operated in series or in parallel. In parallel hook-ups, equipment may be operated under varying loads with this one type of mixer, and any unit may be changed quickly and easily without dismantling pipes, burners, mixers and other equipment. Unproductive downtime is eliminated. For units operated in series, individual burners may be adjusted without changing the output of the other units. The mixer is available in a variety of sizes.

Eclipse Fuel Engineering Co.



2 Plastic Pipe

An improved Carlon "L" rigid plastic pipe and a new compression type coupling incorporating a radically different design have been introduced by Carlon Products Corp. Characteristics of this new pipe and fitting, which are expected to broaden the application of plastic pipe, include increased resistance to burst, high tensile and flexural strengths, greater chemical resistance, the ability to withstand sunlight, and increased life expectancy of rigid plastic pipe. In addition, they feature the same light weight, ease of handling, and absolute resistance to rot, rust and electrolytic corrosion present in other types of Carlon pipe.

Recommended for cross-country piping and processing on exhaust lines handling highly corrosive fumes, gases, and vapors, the pipe can be used for suction lines and, as a natural insulator, is applicable as conduit in underground, underwater, and concrete imbedded installations. It has an ultimate tensile strength of approximately 6000 psi and an effective tensile for piping applications of 3600 psi at room temperature. Burst pressure varies according to pipe diameter (1-in. diameter has burst pressure of over 1000 psi) and is sufficiently great for installations involving moderately high pressures.

Carlon "L" plastic pipe is available in standard sizes from ½ to 2 in. and is supplied in 10 and 20-ft random lengths which can be connected quickly by means of the new compression type coupling or by slip-sleeve tees and ells. With the new coupling, a positive leakproof joint is maintained at all times. Threaded adapters can be furnished to facilitate connection of this new plastic pipe with previously installed metallic piping systems.

Carlon Products Corp.

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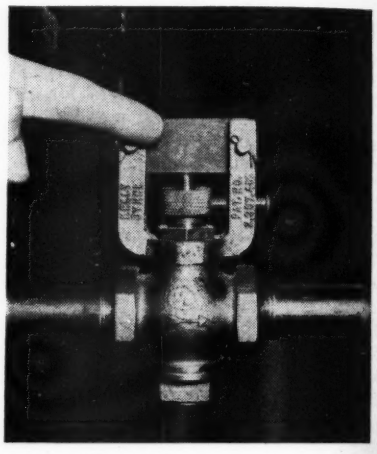

3 Cut-Off Valve

A new type automatic gas cut-off valve has been developed by the Kelly Safety Device Co. The valve is designed for use with natural and manufactured gas and is primarily intended to be placed on a building's gas supply line in front of the gas meter to eliminate fire hazard. In event of fire, a fusible link made of Geon 404 plastic, distorts at approximately 165°F, forcing a tension spring to close the valve.

The valve has ground metal-to-metal seating and proper openings for gas to pass through freely. The valve stem is held in an open position by the plastic link and when excessive heat comes in contact with the plastic, the link spreads, breaks, or becomes elastic enough to allow the stem to spring to its closed position, positively cutting off the flow of gas. Replacement links return the valve to perfect operating condition. The average operating time for the UL-approved valve to close at 200°F is approximately 2½ minutes.

Kelly Safety Device Co.

Mail this Coupon for **NEW PRODUCTS INFORMATION** / **COPIES OF NEW LITERATURE**

GAS, 198 S. Alvarado St., Los Angeles 4, Calif.

11/52 Fill in numbers of items in which you are interested

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NAME AND TITLE.....

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4 Domestic Range

Designed specifically for small homes, kitchenette apartments, motels, trailer coaches, resorts, etc., where maximum cooking facilities must be provided in a minimum of floor space, this range measures only 45 in. high overall, 24 in. deep, and 20 in. wide. Top cooking surface is standard counter height, 36 in. Major features of the new line, the Dixie Wanderer, include automatic timer, automatic oven thermostat, and automatic pilot lights for both top burners and oven. Other features: porcelain enamel finish, fluorescent backguard light, oven light, electric clock, safety-locking burner controls, safety valve for oven burner, and a dual-pane oven window. The range is built for natural, mixed, or bottled gas.

Dixie Foundry Co. Inc.

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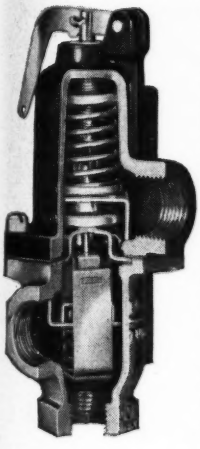
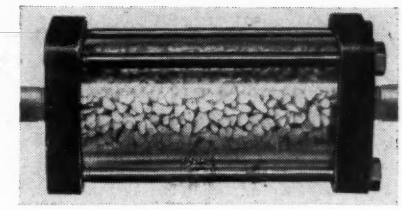
5 Relief Valve



A new line of temperature and pressure relief valves, for use on hot water tanks and heaters, has been introduced by McDonnell & Miller Inc. Known as the 202 Series, these valves are actually a combination of two valves in one assembly and are claimed to offer savings in cost and installation time. These new combination T&P valves are of the automatic reseating type and are Btu-rated for proper selection.

For pressure relief the 202 Series utilizes the operating mechanism of the McDonnell 230 Series; for temperature relief, the operating mechanism of the No. 201 is utilized. An important innovation in the 202 Series is the fixture connection—a ¾-in. tapped opening which permits taking the service water flow directly through the body of the valve. Other features include large and free flowing waterways; non-ferrous, corrosion resistant operating parts; non-adjustable and tamper-proof factory settings. The valves are available with standard opening pressure settings of 75, 100, or 125 lbs.

McDonnell & Miller Inc.



6 Moisture Indicator

King Engineering Corp. has announced an air line moisture indicator for use in air or gas lines to give a positive visual indication of the presence or absence of moisture in the line. The unit consists of a pyrex glass cylinder filled with moisture-sensitive blue granules, and has end plates tapped for ¼-in. pipe. In operation, it is placed in the line between the air supply and the point at which the air is used. The granules stay blue as long as the air leaving the indicator is dry and turn pink when it contains moisture or water vapor.

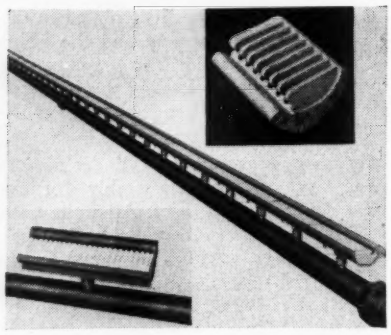
Four tie rods protect the cylinder against damage and permit disassembly for recharging with dry granules. All units with glass cylinder are factory tested at 100 psi; moisture indicators with clear plastic cylinders can be furnished for higher pressures. The indicator, measuring 5 in. long by 2-5/16 in. square, has a pressure drop of less than 1-in. wc at a flow rate of 5 cu ft per minute.

King Engineering Corp.

Consistently Uniform Quality

Whether you install 2 or 2,000 Lancaster Metal Rim Diaphragms, you can be sure of consistently high quality performance in your meters. This is important for sustained meter accuracy and service . . . and it is another reason why so many meter shop men prefer to replace with Lancaster Metal Rim Diaphragms. Write for a sample and see why there is no substitute for Lancaster quality.

METER PARTS CO.



7 Line Burner

A recent announcement by the Burdett Manufacturing Co., the originators of the "radiant heat" principle for use in industrial ovens, discloses the development of what is said to be a more flexible and efficient adaptation of the Burdett principle. What is claimed to be an entirely new concept of design incorporates the following advances: maximum rate of heat transfer; complete combustion, with resulting fuel economy; reduction of processing time; maximum uniformity of product; and minimum low cost maintenance. The accompanying photograph illustrates the simple, sectional refractory design which affords more flexibility in application. This new line burner system may be used for paint, mold, core, moisture, and other drying operations, as well as for food processing, plasticizing, heat treating, aging, burn-off, billet heating, cooking, browning, etc. Available in capacity ranges from 7000 Btu/hr to 45,000 Btu/hr.

Burdett Manufacturing Co.

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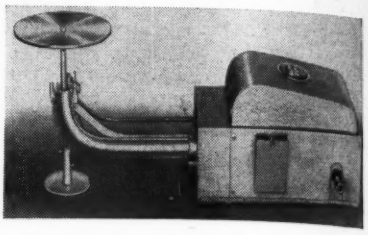


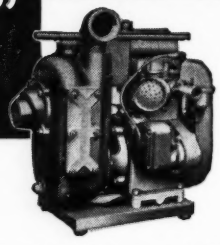
8 Conversion Burner

A new gas conversion burner which will operate without being connected to the house electric circuit has been announced by Harvey-Whipple Inc.

The new burner is of the fountain type and has successfully met AGA tests for natural, mixed, or manufactured gas. It is available in two sizes: 150,000 Btu equipped with 8-in. flame spreader and 175,000 Btu with 10-in. flame spreader. Spreaders are of high grade crome alloy cast steel, and a flame runner lighter is standard equipment. Features include accessibility and ease of service. The automatic pilot assembly can be removed in just a few seconds and all controls and adjustments are easily accessible by lifting off entire jacket. The burner is available with self-energizing controls or with standard type electric controls.

Harvey-Whipple Inc.

Jaeger 60 lb. "Bantam" armored against wear



The only 1½" pump with a replaceable liner plate and stainless steel fitting at point of greatest wear. Engine runs at only 2500 to 3200 rpm instead of the 4200 rpm of pumps that have less capacity. These features mean thousands of extra hours of service. Sure-primes automatically. Pumps 5100 gph. Aluminum model weighs 60 lbs. Powered by 1½ hp. 4-cycle gas engine or ¾ or 1 hp electric motor. See Bulletin LP-9.

Model 2 PAF delivers up to 9000 gph. Primes in a few seconds (less than 1 min. at 25 ft.). Aluminum; weighs 105 lbs., saltwater resistant. Replaceable liner plate and stainless steel fitting at point of greatest wear.

THE JAEGER MACHINE COMPANY 661 Dublin Avenue Columbus 16, Ohio

COMPRESSORS • MIXERS • TRUCK MIXERS • PAVING MACHINERY

for CAST IRON PIPE

CALL OR WRITE

McWANE Cast Iron Pipe Company, Birmingham, Ala.

Pipe sizes 2" thru 12"

Sales Offices

Birmingham 2, Ala., P.O. Box 2601
Chicago 1, Ill., 333 North Michigan Avenue
New York 4, N. Y., 80 Broad Street
Kansas City 6, Mo., 1006 Grand Avenue
Dallas, Texas, 1501 Mercantile Bk. Bldg.

PACIFIC STATES Cast Iron Pipe Co., Provo, Utah

Pipe sizes 2" thru 24"

Sales Offices

Provo, Utah, P.O. Box 18
Denver 2, Colo., 1921 Blake Street
Los Angeles 48, Calif., 6399 Wilshire Blvd.
San Francisco 4, Calif., 235 Montgomery Street
Portland 4, Oregon, 501 Portland Trust Bldg.
Salt Lake City, Waterworks Equipment Co.

TRADE LITERATURE

9 Instrument Folder

A new bulletin (Form FSE-1251) from Johnson-Williams describes four types of combustible gas protective instruments: a portable indicator, a portable audible alarm, and two types of combustible gas alarms for fixed locations. The folder illustrates the various models, describes their style and principles of operation, lists accessories and spare parts, and tabulates specifications for the four models.

Johnson-Williams Ltd.

■

10 Thermocouples

A new bulletin from Minneapolis-Honeywell introduces three new thermocouple wires suitable for use in temperatures varying from minus 20 to 2000° F. Consisting of two pages, the bulletin lists engineering data and representative applications for each.

Minneapolis-Honeywell Regulator Co.

■

11 Radial Engines

A new, three-color, 20-page bulletin on the design, operation and application of Nordberg radial engines has been published by Nordberg Manufacturing Co. It contains a description and sectional line drawings of the installation and operating advantages

given by the radial design. Cost, operation, and maintenance features are also discussed. Each type of operation and diagrams and data in each section explain the various fuel injection and combustion systems. Also contained in the bulletin are photographs of typical installations and a schematic drawing of the engine's lubricating system.

Nordberg Manufacturing Co.

■

12 Heating Literature

A complete revision of literature to include new designs and data on its line of gas heaters has been prepared by Reznor Manufacturing Co. Heading the list is a 20-page general catalog in which the Reznor line is classified into four types of heaters, commercial, industrial, institutional and residential, which it manufactures. The catalog presents the subject factually with a minimum of selling copy.

Reznor Manufacturing Co.

■

13 New Plug Valve Drill

A bulletin from T. D. Williamson Inc. describes the company's new plug valve drill. The new cutter is designed for use with the Hillco tapping machine and all plug valves of 4 in. and smaller. The four-page illustrated bulletin details the operations of the drill and the broader applications of the Hillco tapping machines with which it is used.

T. D. Williamson Inc.

CURRENT READING

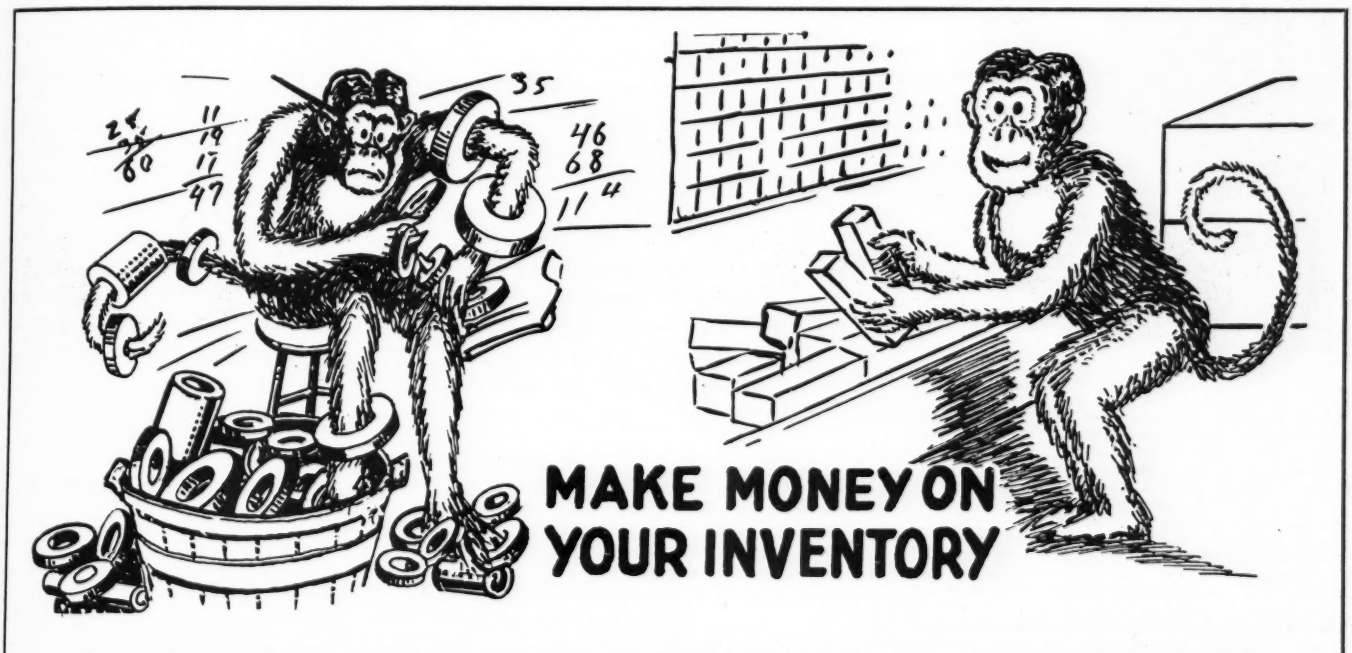
A MANUAL ON UNDERGROUND CORROSION — This is a 37-page illustrated roundup of the latest information on corrosion causes and corrective measures published by the Columbia Gas System. Columbia designed the manual to give the system's operating personnel a better understanding of the general problem of corrosion. Three committees—gas production, transmission, and distribution—prepared the manual, which starts with an explanation and illustration of the galvanic cell, is technically thorough, and clearly illustrated with 52 drawings. Because of its wide appeal to the many industries which must cope with corrosion problems, Columbia Gas has made the manual available at cost, 75 cents. Requests should be addressed to M. L. Hosler, gas engineering department, Columbia Gas System Service Corp., 79 N. Third St., Columbus 15, Ohio.

SYNTHETIC LIQUID FUELS—This is the annual report of the Secretary of the Interior for 1951. Owing to the broad scope of the content and the diversity of interests represented, the annual report for 1951 has been divided into two separate publications and each has been published by the Bureau of Mines as a Report of Investigations. The respective titles are: R.I. 4865, Part I, Oil from Coal, and R.I. 4866, Part II, Oil from Oil Shale. The introduction in each report summarizes research progress made in 1951 under the synthetic liquid fuels program.

As a result of the Bureau of Mines program and the increased activity of private industry, significant progress has been made during the past seven years. One commercial synthetic fuel plant using natural gas has been constructed; oil-shale processes are nearing commercial exploitation; coal hydrogenation has been demonstrated with American-built equipment and commercial plants have been proposed; in 1951 the bureau successfully demonstrated a new gas-synthesis process; and significant advances have been made in developing direct coal-gasification processes.

A free copy of these publications may be obtained by a written request to the Bureau of Mines, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. The R.I. number and title of the publication desired should be indicated.

BRASS MELTING FURNACES AND BRASS MELTING—This letter, the first on non-ferrous metal melting techniques, has been issued by the metals committee of the AGA industrial and commercial gas section. It goes into considerable detail on the several types of melters in use today and gives the advantages and disadvantages of each type for specific melting and also the required Btu inputs for each type of gas-fired melter. It also goes into the reasons for poor castings and sets forth proper practices necessary to minimize rejects and to eliminate porosity and gassing as far as possible. Information letter No. 49.



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A Rate-Saturation Curve For Gas Companies

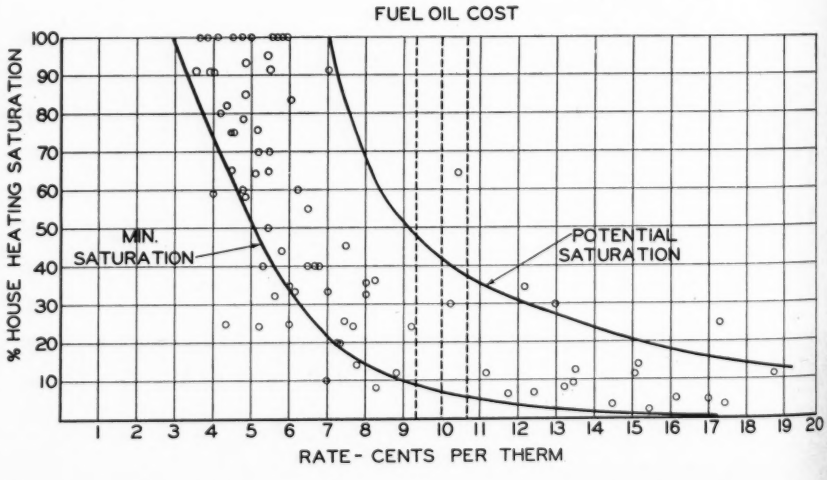
In discussing the subject of a joint promotion of "house heating" before the New England Gas Assn., Frank Nunlist, general sales manager for the L. J. Mueller Furnace Co. of Milwaukee, illustrated his talk with the chart shown below. The small dots throughout the chart represent gas utility companies in various areas throughout the United States. They are located on the chart in accordance with their existing gas rate and their present saturation of the gas house heating market as of Jan. 1, 1952. In the center of the chart there are three broken lines that indicate comparative fuel oil costs. Mr. Nunlist explained that the minimum saturation and potential saturation lines are based on a curve established hypothetically by existing conditions throughout the country, taking into account certain restrictions through fuel limitations, etc.

It can be seen from the chart that, under normal circumstances, if a gas utility had a 6 cents per therm rate, they should get—over a period of five years—about a 35% saturation of the market with a minimum of promotion. However, with that rate, and if they promote gas house heating extensively, their potential saturation is unlimited. On the same basis, a company having a rate of 12 cents per therm can expect only a 5% saturation without any promotion, yet could normally expect to increase their saturation to about 32%—over a period of three to five years—if they promoted gas heating strongly. The chart shows that certain utilities have done considerably better than their potential saturation while other utilities enjoying extremely low gas rates are not even up to their minimum saturation.

Mr. Nunlist concluded: "This [chart] shows that there is no easy, well-iced toboggan slide to success, but rather, that rates alone are only one factor in the development of a satisfactory load-building program . . . certain 'plus' factors account for a large share of the successful results.

"First among these 'plus' factors is the desire of utility management for growth. If this desire on the part of management is present, then I am sure that growth is inevitable. Obviously, one of the first problems to be resolved and programs to be planned is the determination of the point of diminishing revenue.

"Utilities must begin to fertilize this almost barren field of house-heating that is now yielding only a small crop. They must plan rate reductions as quickly as conversion costs are amortized. They must invest moneys in promotional activities; they must maintain improved public relations and consumer educational programs. They must look for this market, not reluctantly; but rather, enthusiastically."



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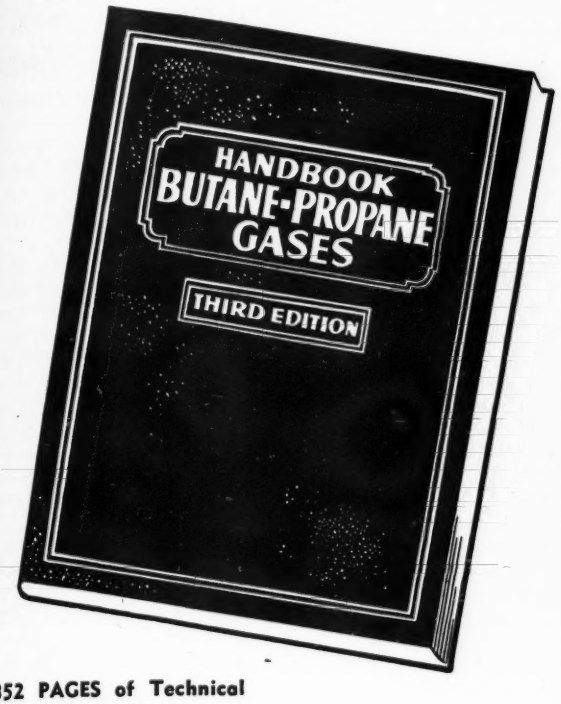

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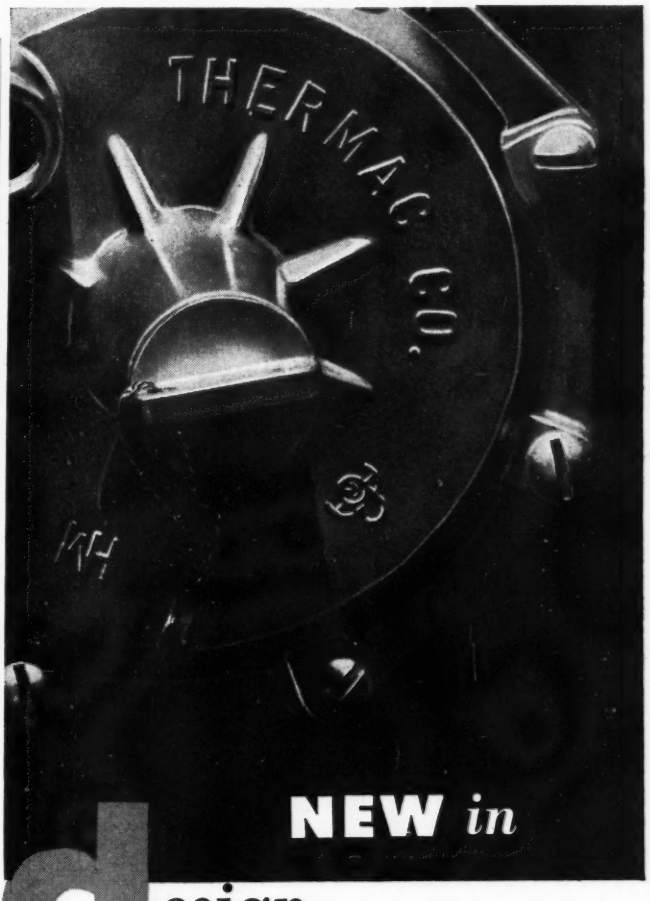

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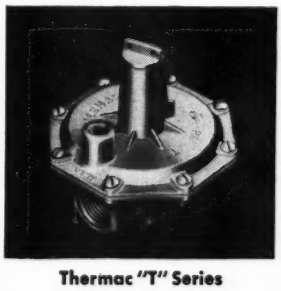

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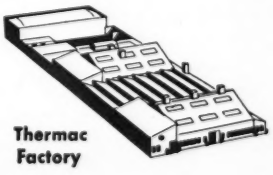

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AGA's Revised Constitution Approved By Membership

Proposed revisions of the AGA constitution and by-laws, including such sweeping changes as the elimination of the manufactured gas and natural gas departments and the establishment of the general management section, have won overwhelming approval by the association's membership. Accordingly, the new provisions will go into effect two weeks after adjournment of the annual convention in Atlantic City Oct. 30.

Although sponsorship of certain separate activities of specific interest to the manufactured and natural gas segments will be continued, the spread of natural gas to virtually every area of the country has eliminated the need for separate departments.

The general management section will deal with management matters other than accounting, operating, and sales promotion. Four existing committees will be placed under this wing, including the general nominating committee, the laboratories managing committee, the finance committee, and the PAR committee. The publicity and advertising committee is eliminated as a general committee, and will be re-designated.

Under the provisions of the shake-up, the manufacturers section, which has existed in name only since GAMA was formed, is dropped. Other provisions change the make-up and duties of the executive board, the board of directors, and the advisory board. Eskil I. Bjork, president of Peoples Gas, Chicago, headed the committee charged with the remodeling job.

Standard Revisions Sent For Manufacturer Criticism

A new set of "Recommended Revisions to American Standard Installation of Gas Piping and Gas Appliances in Buildings" was circulated last month by the AGA Laboratories to manufacturers of approved gas appliances and accessories, marked "for criticism only."

The recommendations were prepared by a subcommittee on standards following consideration of comment received in response to a similar invitation for criticism last December. Major changes incorporated in the new provisions were made in the sections covering venting of gas appliances. Appliances were classified into three categories—those requiring venting, those not requiring venting, and those which are permitted to be installed unvented under local regulations but have restricted application.

Replies before Nov. 15 were requested.

Oklahoma City Scene Of Utility Group Meeting

The standard gas measurement law passed by the last Oklahoma legislature is posing some serious problems for the gas industry in Oklahoma, Earl Fox, natural gas engineer, Consolidated Gas Utilities Corp., Oklahoma City, brought out in a paper before the gas division of the Oklahoma Utilities Assn., at Oklahoma City, Sept. 19.

Under provisions of the law, all gas purchases made at the wellhead must now be calculated on a 4-oz pressure base, rather than on a 2-lb pressure base as was done in the majority of cases heretofore.

"This business of pressure and pressure base is worthy of very serious consideration, because in our business it is the index of the amount of gas purchased and sold," said Mr. Fox. "Since the gas measurement law operates to eliminate the advantages we have heretofore enjoyed, as occasioned by volume differentials due to the different pressure bases of purchases and sales, the time has come for a more careful scrutiny of accepted operating practices."

Among other subjects given prominent attention at the meeting were "Unaccounted-for Gas," presented by P. K. Wallace, Oklahoma Natural Gas Co., Tulsa; "Proper Venting Practices," by C. E. Blome, William Wallace Co., Dallas; "The Real Competition," by William E. Bambrick, Caloric Stove Corp., Baton Rouge, La.; "Army Management Improvement Program," by Lt. Col. Charles A. Corcoran, Fort Sill, Okla.

Presiding over the sessions was H. C. Webb, vice president, Oklahoma Natural Gas Co., Tulsa, who also is chairman of the gas division for 1952.

CNGA Holds Fall Meeting

The Ambassador hotel in Los Angeles was the scene of the 27th annual fall meeting of the California Natural Gasoline Assn. last month. As usual, the first day of the

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two-day meeting was devoted to forums and the second day to a general session.

Five forums were held the first day covering compressors and engines, processing and design, testing, field and plant lines, and management. A question and discussion period followed each talk.

At the general meeting on the second day, various speakers described recent trends in automotive engines, in the natural gasoline industry, in geology, in production and drilling, in refining, and in business and government. The meeting was climaxed by a cocktail party and banquet.

AGA, GAMA, Sponsor Essay Contest on Exposition

Prizes totaling $650 in U. S. Defense Bonds will be awarded to 15 gas utility employees who submit winning papers on what they saw and learned at the GAMA exposition that was held in conjunction with the AGA convention last month.

A contest committee made up of Bill Clark, editor of *GAS*; Harold Springborn, executive editor of *Gas Age*, and Elliott Taylor, editor of *American Gas Journal*, will judge papers on (1) degree of coverage of a sector, such as ranges, distribution equipment, etc.; (2) inclusion of new developments displayed; (3) newly-gained knowledge benefiting the contestant and his company. GAMA will present bonds comprising $200 for first prize, $100 for second, $50 for third, and 12 fourth prizes of $25 each.

Papers should be sent on or before midnight Dec. 15, 1952, to exposition contest manager, American Gas Assn., 420 Lexington Ave., New York 17. Each entry must be certified to show the contestant is a gas company employee and all papers will become AGA property.

Industrial Gasmen Meet

Texas Illinois Natural Gas Pipeline Co. all but stole the show when 125 industrial gasmen from the midwestern states attended the Midwest Industrial Gas Council in Chicago Sept. 19.

"Welding America," a sound film in color depicting the construction of the new Texas-to-Chicago line, and a talk by Mark V. Burlingame, vice president of Texas Illinois, on underground storage of gas were the highlights of the afternoon program.

The morning session was largely devoted to industrial gas equipment, including a talk on combustion flame failure safeguards, electronic safety controls, and dual fuel burner equipment.

AGA Wins Safety Award

In recognition of its work in the distribution and promotion of safe installation standards for gas appliances among architects, builders, utility companies, enforcement agencies, and home owners, AGA last month was awarded the National Safety Council's certificate of commendation and a citation for meritorious activity in home safety education for 1951-52.

Along with the new safety standard (ASA Z21.30), which has been enacted into many statutes, AGA's laboratory testing program and association-inspired articles on safety were also praised by the council.

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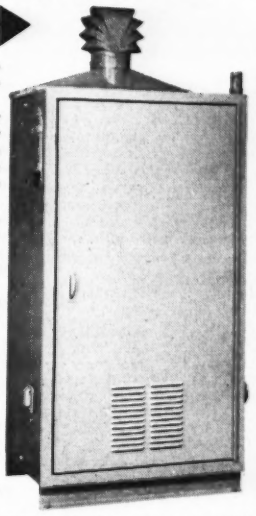

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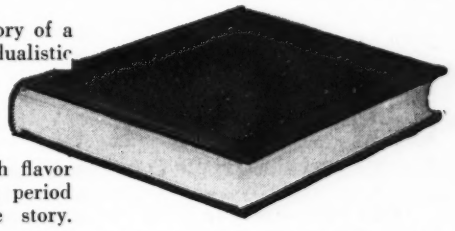

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November

10-13....American Petroleum Institute Annual Meeting—Chicago.

10-14....National Hotel Exposition—Grand Central Palace, New York.

12....NEGA Sales Division — Boston Gas Auditorium, Boston.

13....Southern Gas Assn. Eastern Area All-Year Gas Air Conditioning Round Table Conference —Tutwiler hotel, Birmingham.

13....NEGA Sales Division—Connecticut Light & Power Auditorium, Berlin, Conn.

14....SGA Eastern Area Residential Sales Round Table Conference—Tutwiler hotel, Birmingham.

14....AGA Great Lakes Personnel Conference—Chicago.

19....American Standards Assn.—Waldorf-Astoria, New York.

19....NEGA Safety Conference—Hotel Statler, Boston.

19-20....Pacific Coast Gas Assn. Accounting Section Group—Fresno, Calif.

20-21....Mid-Southeastern Gas Assn.—The Sir Walter hotel, Raleigh, N. C.

30-Dec. 5....American Society of Mechanical Engineers—Hotel Statler, New York.

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1-3....SGA, The Gas Company Advisory Council & Management Conference—Grand hotel, Pt. Clear, Ala.

5....NEGA Industrial Group of Industrial Division — Hampshire House, Boston.

11....NEGA Appliance Servicing Conference—Hotel Bradford, Boston.

January 1953

19-21....Pipe Line Contractors Assn. Annual Convention & Exhibition—Shamrock hotel, Houston.

February

2-4....AGA Home Service Workshop —Baker hotel, Dallas.

March

16-20....National Association of Corrosion Engineers—Hotel Sherman, Chicago.

26-27....Oklahoma Utilities Assn. Annual Convention — Tulsa hotel, Tulsa.

26-27....New England Gas Assn.—Hotel Statler, Boston.

30-Apr. 1....Midwest Gas Assn. Annual Convention — Broadmoor hotel, Colorado Springs.

April

12-16....AGA Distribution, Motor Vehicles and Corrosion Conference—Hotel Sherman, Chicago.

13-15....AGA Accounting Section, Purchasing and Stores Conference—Shroeder hotel, Milwaukee.

13-15....AGA Sales Conference on Industrial and Commercial Gas—Hotel Warwick, Philadelphia.

16-18....Florida-Georgia Gas Assn.—Hotel Biltmore, Palm Beach, Fla.

20-22....National Conference of Electric & Gas Utility Accountants—Hotel Sherman, Chicago.

21-23....Southwestern Gas Measurement Short Course — University of Oklahoma, Norman.

23-24....Indiana Gas Assn. Annual Convention — French Lick Springs hotel, French Lick, Ind. (Tentative).

27-29....Mid-West Regional Gas Sales Conference — Edgewater Beach hotel, Chicago.

29-May 1....Natural Gasoline Assn. of America Annual Convention—Rice hotel, Houston.

30-May 1....AGA Natural Gas Technical Conference — Edgewater Beach hotel, Chicago.

May

4-6....LPGA Annual Convention — Conrad Hilton hotel, Chicago.

4-8....AGA Industrial Gas School—Sheraton-Cadillac hotel, Detroit.

Week of May 10....34th Annual National Restaurant Convention & Exposition—Navy Pier, Chicago.

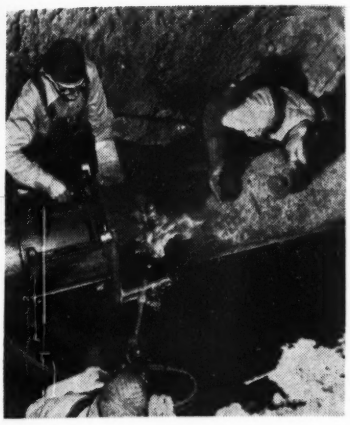
11-13....Southern Gas Assn.—Jung Hotel, New Orleans.

11-15....34th Annual National Restaurant Convention & Exposition—Navy Pier, Chicago.

12-14....Pennsylvania Gas Assn. Convention.

GAS

PIPELINE NEWS AND FEATURES



1. As welders start the cut, flames burst from the pipe. Welder at right packs cut with mud to curtail escaping gas.

Welding Under Fire

One of the most spectacular jobs in pipelining is working under fire, and when Northern Natural Gas Co., Omaha, had a valve removal operation to perform last summer, the photographer was right on the job to snap some brilliant shots.

The project involved the cutting out of a section of 20-in. line north of Palmyra, Neb. Although the line had been bled, residual quantities of gas escaped through the cuts made by the welders. Mud packing helped hold the flames to a minimum during this phase of operations.

After the valve section had been removed, a straight section was inserted and the welders went to work again. This time no mud could be used, because the joints had to be kept clean. The gas continued to flow with no letup during the job, so the welders were under fire until the cuts were sealed.

It was a relatively cool day considering the season—but the men in the hole might as well have been in the middle of the Sahara.

Photos by Robert Hanson of Northern Natural. Courtesy of Northern Natural News.

2. To facilitate lifting the valve section out of the bell hole, a second cut is made at an angle to the original cut. Once again flames enveloped the pipe.

3. With the new section in place, flames leap high as welder gets stringer bead started. No mud could be used on this phase, and the welder bucked flames until the first pass was completed.

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UNIBOLT SCRAPER TRAP

Combustion Air Cooling for Better Engine Performance

By LYNN K. FINNEY
Kettleman North Dome Assn.

THE idea of cooling combustion air for gas engines is not new. Everyone has noticed the change in the operation of an automobile engine that takes place when the car leaves a hot valley and drives along cool highways in the hills or by the coast. Operators of gas engines in hot desert country note the better operation of their equipment when cool weather rolls around.

Several companies have developed and marketed equipment for cooling combustion air. The Coblentz Equipment Co. of Erie, Pa., has developed what it describes as a package unit to convert exhaust gas waste heat into refrigeration. This unit provides a source of chilled water that can be used for air cooling by combining a waste heat boiler and a hermetically sealed refrigeration system.

A huge aluminum reduction plant has recently been constructed for the Reynolds Metal Co. down in Texas across the bay from Corpus Christi. Forty-two Cooper-Bessemer 16-cylinder, 4-cycle, turbocharged, natural gas engines rated at 3700 hp each, are installed in this plant to drive electric generators. Each of these large gas engines is equipped with American Air Filter Co.'s multi-duty, Type CMS air filter, which not only cleans the engine air, but also automatically cleans itself. In addition, this clean combustion air is then pre-cooled by a Marley redwood, evaporative cooler before being used in the turbocharger.

This is the first of two articles on the subject of cooling combustion air. The second article describing the development and application of the air-intake-cooler system for engines, will appear next month.

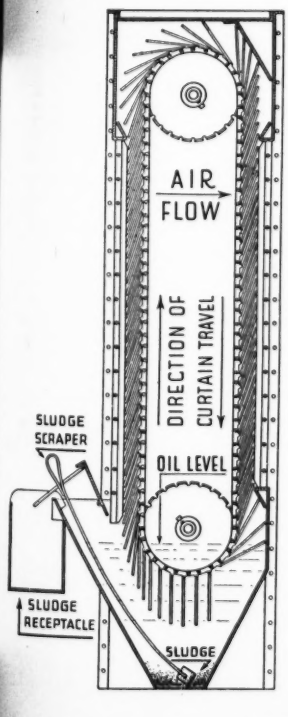
It has been well established by the engine manufacturers that any engine, gas, gas-diesel or full diesel, either 2-cycle or 4-cycle, must be derated about 2% for each 10° rise in ambient air temperature above 90° F (see *Fig. 1*). It is clearly evident, therefore, that operators must plan to keep the combustion air from heating up if they expect to obtain the full rated horsepower from their engines.

Several years ago our company purchased two air filters that were designed not only to clean the air, but also to cool it with a water spray and wash off the accumulated dirt on the filtering medium. Our tests of these filters proved that the filtering medium was excellent, but we were unable to keep them clean with the water spray and such a large amount of water was necessary to achieve any air cooling that they became uneconomical to operate.

However, since discussing this problem of high temperature combustion air with other operators and engine company representatives, we decided to experiment with air cooling in order to determine if any improvement in operation could be expected from our older horizontal type engine. We rebuilt these old air cleaners, attempting to retain the good cleaning features and adding air cooling by water evaporation. After several attempts that always seemed to prove wrong, we finally built a unit that we believe will do a satisfactory job of cleaning and also attain some reduction in air temperature.

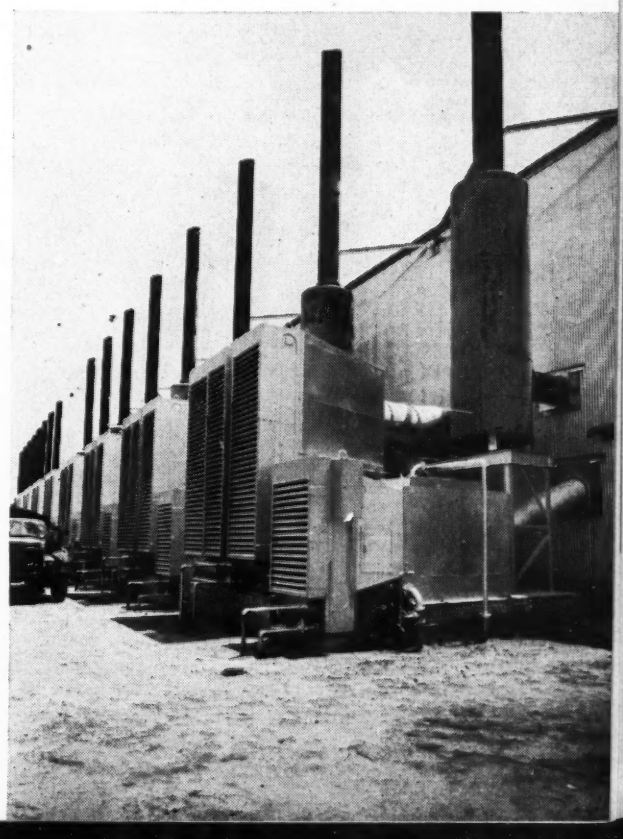
Our company operates many horizontal type, gas engine-driven compressors that were installed years ago without much thought being given to build-

This paper was presented at the fall meeting of the California Natural Gasoline Assn. in Los Angeles, Oct. 9-10.



Left: Cross section drawing showing principle of operation of American Air Filter's multi-duty Type CMS. The filter curtain of the multi-duty consists of closely overlapping panels suspended from attachments on two endless chains. When in the air stream the panels overlap like shingles to form a continuous curtain four panels deep, but upon entering the oil reservoir in the base of the filter the panels automatically separate and are individually cleaned. When the panels are submerged the surface tension of the oil film that binds the dust to the screen wire is relieved and the dust particles sink to the bottom of the reservoir as sludge.

The cleaned and freshly viscous coated panels are again automatically reassembled as a curtain upon entering the air stream at the front of the filter. At right, the air intake filter connection to the Marley Aquatower as used at the Reynolds Metal Co. plant near Corpus Christi.



ing ventilation or the proximity of the air intake lines to the hot exhaust lines. Changes in the buildings have resulted in better ventilation and lower temperatures within the buildings, but the intake air temperature continues to be above the atmospheric temperature, and that goes well above 100° much of the time in the summer.

The test engine, a Cooper-Bessemer Type 80, was given a thorough overhaul. The power end had new sealing rings installed on the piston, new intake and discharge valves and seats, the cam box worked over and new bushings installed wherever necessary. The old cams were replaced with special high lift and hardened cams and the old strip type magnetoes were replaced with a single, high tension rotary magneto making it possible to have accurate timing.

The compressor end has a 10½-in. Class B cylinder on the first stage and a 6-in. Class A cylinder on the second stage. The pistons for both these cylinders were removed and new bronze rings installed. All intake and discharge valves in both cylinders were replaced with overhauled valves. The 10½-in. cylinder has 10.5% built in clearance and four bottles with 397.23 cu in. added clearance, making a total of 28.94%.

Tests indicated that the effective horsepower developed had been increased 4.75% to 178 hp with the installation of the new cams and improved ignition.

The tests consisted of operating the engine under a series of increasing loads, first with the combustion air uncooled and then with the combustion air cooled, and observing and recording the engine condition, the quantity of gas compressed and the hp used. Conditions for each comparable test were held as near constant as possible, although atmospheric temperature, gas temperature, and gas pressure varied some during the days used to complete the tests. Before each test and every 15 minutes during the test, indicator cards were run on both sides of the engine.

The results and operating conditions of each series of tests are shown on *Tables 1, 2,* and *3.*

For test No. 1 series No. 1 the intake gas pressure was set at 45 psi which loaded the engine to its rated 170 hp before the installation of the new cams. The engine easily handled this load, running up against the governor all the time. The water through the engine jackets had a 35° rise which is too much for good operation, but is normal for this plant.

The gas pressure was increased to 50 psi for the second test of this first series. The combustion air temperature was 93° and the temperature rise in the jacket water was 37°. It required 177 hp to compress the 1349 Mcf/24 hours of gas from 50 to 460 psi. The engine handled this load without any loss of speed or any detonation, although it did not run up against the governor as it did in the first test.

The pressure of the intake gas was again increased from 5 to 55 psi for the third test and 183 hp was used to compress this gas rate of 1454 Mcf/24 hours. The temperature of the combustion air was up to 99° and the jacket water temperature climbed to 41°. The engine showed signs of overloading and was gradually losing speed, while detonation, at first only slight, became quite heavy with continued operation as the test progressed.

The second series of tests were exact duplicates of the first except that the combustion air was cooled. It was unfortunate that during the days we ran these tests the weather turned cooler and we were unable to obtain as much air cooling as we had at other times.

In the first test of the second series we were able to cool the combustion air 10°, although this was the one day when the average atmospheric temperature did reach 100°. The cooled air with a temperature of 92° was still 1° higher than in the comparable test of the first series. It will be noted from *Tables 1* and *2* that the conditions were practically identical for both tests. However, more vacuum was required to pull the air through the dampened filters. The engine again ran up against the governor, handling this load without any apparent effort.

The second test of this series was run on one of the coolest days experienced this summer in Kettleman Hills. A breeze right off the ocean cooled the hills so that the average atmospheric temper-

TABLE 1. 1st Series
Combustion Air Uncooled

Test No.	Atmos. Temp.	Combustion Air Temperature Without Cooling	Combustion Air Temperature With Cooling	Vacuum Air line Cooler to Eng.	Jacket Water Temperature In	Jacket Water Temperature Out	RPM	HP Used	Gas Compressed 1st Stage Intake Pr.	1st Stage Intake Temp.	2nd Stage Intake Pr.	2nd Stage Intake Temp.	2nd Stage Disch. Pr.	24 Hr. Rate MCF
1	88°	91°	-	1.0"	111°	146°	200	170	45#	105°	160#	225°	460#	1244
2	88°	93°	-	1.0"	110°	147°	200	177	50#	106°	175#	225°	460#	1349
3	95°	99°	-	1.0"	111°	152°	200	183	55#	109°	190#	225°	460#	1454

TABLE 2. 2nd Series
Combustion Air Cooled

Test No.	Atmos. Temp.	Combustion Air Temperature Without Cooling	Combustion Air Temperature With Cooling	Vacuum Air line Cooler to Eng.	Jacket Water Temperature In	Jacket Water Temperature Out	RPM	HP Used	Gas Compressed 1st Stage Intake Pr.	1st Stage Intake Temp.	2nd Stage Intake Pr.	2nd Stage Intake Temp.	2nd Stage Disch. Pr.	24 Hr. Rate MCF
1	100°	102°	92°	1.3"	115°	150°	200	169	45#	119°	161#	239°	455#	1244
2	76°	92°	84°	1.3"	111°	147°	200	180	50#	107°	173#	232°	455#	1379
3	86°	96°	88°	1.5"	110°	146°	200	193	55#	113°	182#	234°	455#	1541

TABLE 3. 3rd Series
Combustion Air Cooled
Speed 210 RPM

Test No.	Atmos. Temp.	Combustion Air Temperature Without Cooling	Combustion Air Temperature With Cooling	Vacuum Air line Cooler to Eng.	Jacket Water Temperature In	Jacket Water Temperature Out	RPM	HP Used	Gas Compressed 1st Stage Intake Pr.	1st Stage Intake Temp.	2nd Stage Intake Pr.	2nd Stage Intake Temp.	2nd Stage Disch. Pr.	24 Hr. Rate MCF
1	92°	100°	91°	1.3"	112°	146°	210	176	45#	116°	162#	239°	455#	1295
2	91°	100°	91°	1.3"	110°	148°	210	186	50#	117°	174#	239°	450#	1444
3	90°	98°	89°	1.5"	110°	150°	210	199	55#	118°	185#	241°	450#	1590

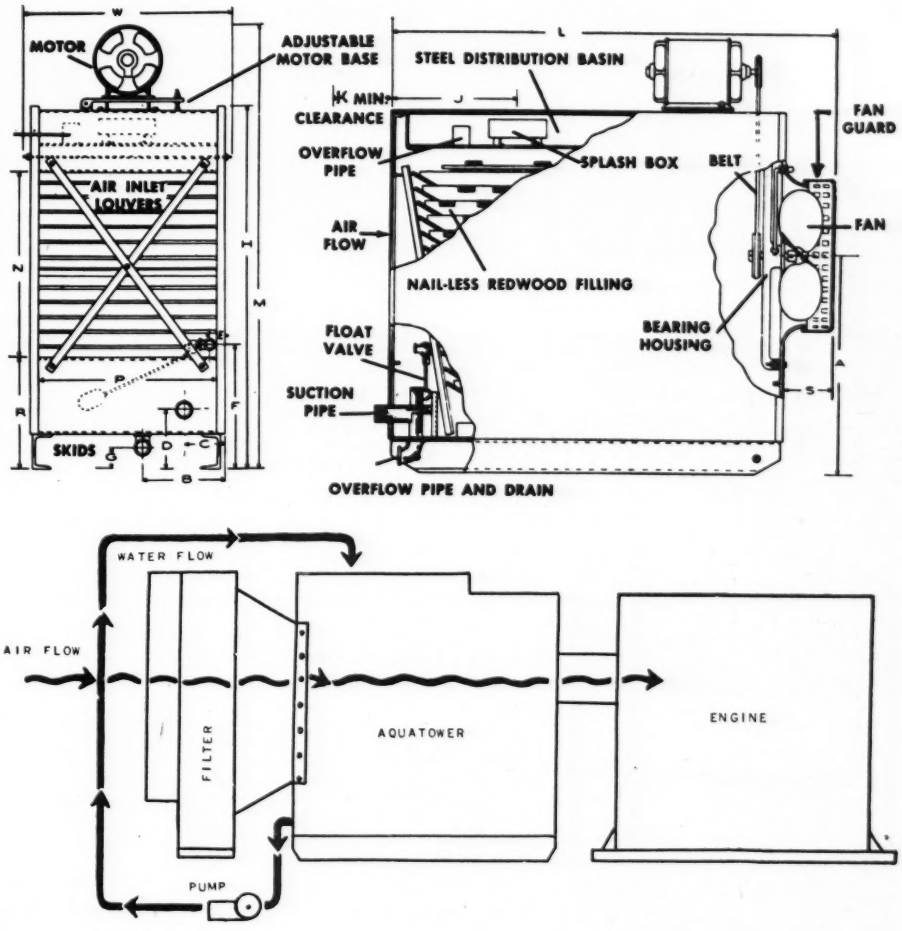
ature during the test was only 76°. The dry combustion air was 92° and we were able to cool this to 84°, which was 9° less than the comparable test. The conditions for this test were quite similar to the test at 50 psi with uncooled air, although a little more gas was compressed due to lower discharge pressures and a small increase in horsepower was developed. The engine handled this light overload without any signs of overheating, slowing down or detonation.

As in the first series the intake gas pressure was increased to 55 psi for the third test. The cooled combustion air was 88° or 11° cooler than the comparable test with uncooled air and more vacuum was required in the air line to get the cooled air into the cylinders. I believe it is important to note that the rise in the jacket water temperature remained constant with the cooled combustion air, even with the hp output increased. We believe this is owing partially to some moisture being introduced into the cylinders along with the cooled air. The gas conditions changed enough to allow 1541 Mcf/24 hours, an increase of 5.98% to be compressed. This also increased the hp output to 193, which is a 5.46% increase. The engine ran right up to 200 rpm, although not up against the governor as in the previous tests and there was not any detonation whatsoever.

Additional tests at even higher pressure and heavier loads were impossible as there is not any gas available at this plant at pressure above 55 psi. However, we did run a third series of tests as shown by the chart, *Table 3*, with the engine speeded up to 210 rpm. There was as expected a small increase in the quantity of gas compressed at 45 and 50 psi intake pressure, but the engine did not run as well as at 200 rpm. When the intake pressure was raised above 50 psi, detonation began and at 55 became quite strong. The temperature increased and the speed began to fall off. Of course, at 199 hp the engine was considerably overloaded and it just would not handle this load for any length of time.

Although, with our field-made cooling equipment we were unable to lower the temperature as much as we would have liked, we definitely know that the operation of this engine was considerably improved, with more gas being compressed. After all that's what we are looking for. From the test data it appears that with uncooled air, a load of approximately 177-180 hp is all that this engine can be expected to handle in continuous service. But with the combustion air cooled even as little as we were able to cool it during these tests, a load of 193-195 hp should be handled without trouble or damage to the engine. This is an 8.33% increase in hp output and is certainly an easy and not too expensive way to get it. The results of our tests do not follow the curve as shown in *Fig. 1*, but I believe that this curve applies to modern multi-cylinder engines. And besides during our test we were near or below the 90° shown for 100% hp output.

We are sufficiently pleased with the results of this test that we are going to try to improve our cooler type air cleaner, and run some additional tests. If the results of these tests show added improvement in operation, we certainly will consider the installation of combustion air cooling on all our horizontal type engines.



Schematic and flow diagrams of the Marley Aquatower for pre-cooling combustion air. Regardless of the dry bulb temperature, the outgoing air will be the same temperature as the cold water temperature in the tower. When water is circulated through an Aquatower without a heat load, the water temperature soon approaches the wet bulb temperature. Since the wet bulb temperature never exceeds 80° F to 83° F in any part of the country, the air leaving the tower will not exceed this temperature. Cooling increases the density of the air which serves the same purpose as a supercharger. The increased weight per cu ft provides more oxygen to support combustion.

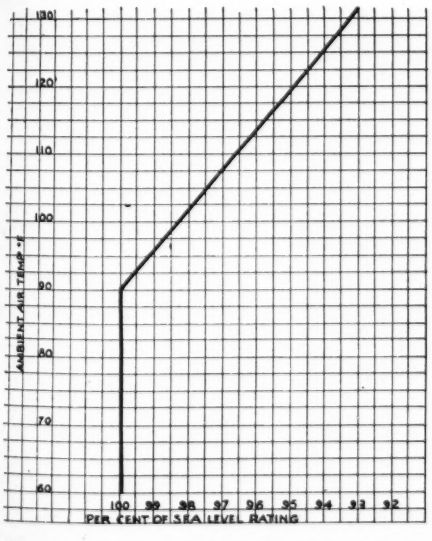
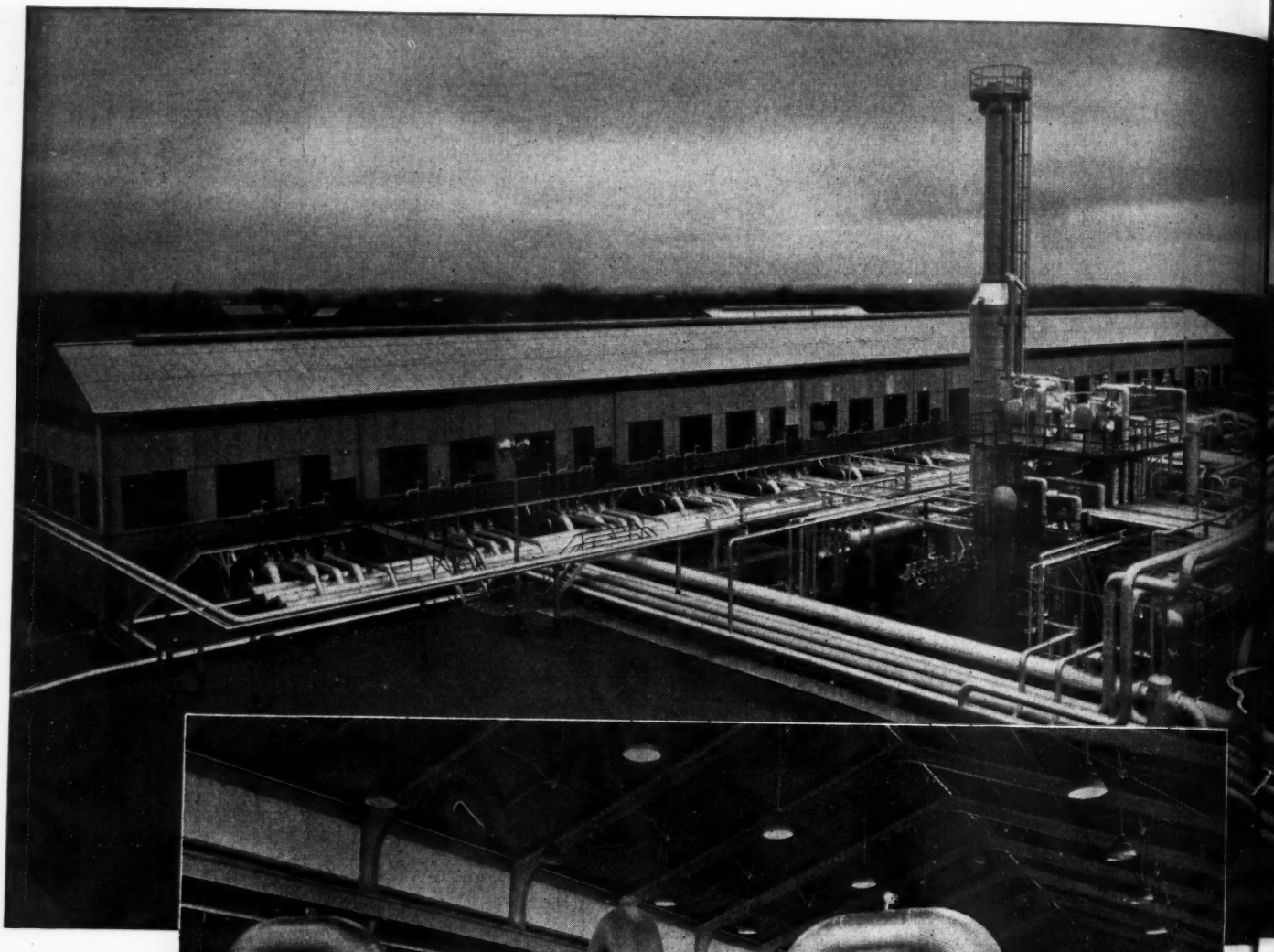
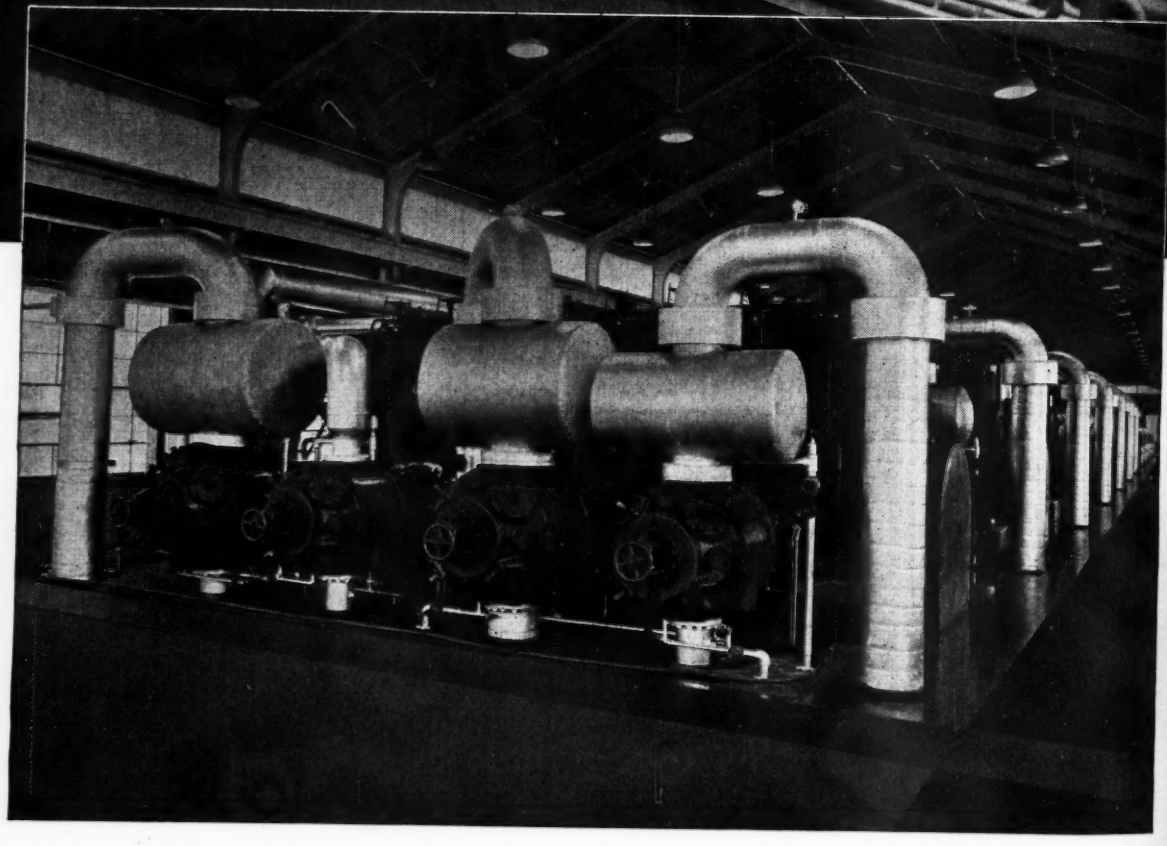


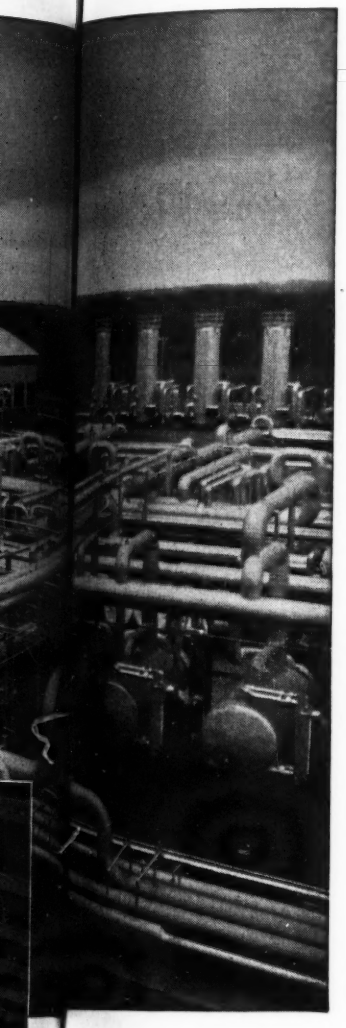
Fig. 1. Temperature derating for all gas, gas-diesel, and diesel engines.

Clark "Big Angles"





score another first!



Clark HBA Compressors, Famed for Sustained Fuel Economy and Dependability, Installed in World's Largest Ethane Recovery Plant

Tennessee Gas Transmission Company recently placed in service the largest ethane recovery plant ever built for operation in conjunction with a gas transmission pipeline. In designing the Gabe, Kentucky plant, process requirements dictated the following rigid compressor specifications:

- A total of 23,000 horsepower required
- 1600 to 1800 horsepower units were necessary for proper compressor distribution between the five compression services
- 750,000,000 cubic feet per day capacity
- Four compressor cylinders per unit
- Minimum fuel consumption was necessary because overall economics indicated an "end of the line" high fuel cost, plant location

With over 135,000 horsepower of Clark BA and HBA compressors already operating in their other compressor stations or on order, Tennessee Gas Transmission Co. knew first hand what the "Big Angle" could do. Thirteen Clark 1760 BHP, High Compression "Big Angles" were subsequently installed to handle all compression services in the new plant. These services include propane refrigeration, ethane refrigeration, reactivating gas service, flash gas service and the return of residue gas to the pipeline.

If you are contemplating building a plant involving intricate processing operations, consult your nearest Clark representative. He has the compressor know-how and a complete line of heavy duty compressor equipment to simplify your installation.

For complete details on Clark Big Angles request Bulletin 104

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Royalty Owners Air Complaints as INGAA Makes Bid for Gas Industry Harmony

GRIPES directed at each other and at the Federal Power Commission were given a general airing when 200 representatives of pipeline companies, producers, utilities, royalty owners, investors, and state regulatory bodies joined in a panel discussion at Omaha Oct 6. The circumstance was the one-day annual meeting of the young and vigorous Independent Natural Gas Assn. of America.

Appropriately, the setting for the seldom heated but frequently frank discussions was the home city of Northern Natural Gas Co., whose recent rate and "reserves dedication" cases brought forth decisions from the FPC which have created a storm of controversy. In fact, the commission's "cost-of-money" concept, first established in the Northern Natural and Colorado Interstate cases, was the most important single issue on the agenda. This phase of the meeting is covered in a separate article on page 104.

Otherwise, the program was a series of statements of problems, new and old, facing the industry. Constructed as a means of attempting to get the various segments of this non-integrated industry onto a logical basis for harmonic action, the program brought in many new faces for the purpose of hearing what the opposition had to say.

The relatively mild addresses of Russell B. Brown, general counsel of the Independent Petroleum Assn. of America, giving the "Viewpoint of the Producer" and A. E. Kramer, secretary of the Southwest Kansas Royalty Owners Assn., posing "questions" of the royalty owners, were overshadowed by the strongly assertive talk by Bryan W. Payne, president of the Texas Independent Producers & Royalty Owners Assn., who spoke on "Natural Gas and the Royalty Owner."

J. J. Hedrick, president of the Natural Gas Pipeline Co. of America and affiliates, whose topic was "Problems of Natural Gas Pipeline Companies," spearheaded the rebuttal forces, occasionally straying from his prepared paper to answer some of the charges made by Payne.

Harold P. Huls, California Public Utilities Commission member, handled his report on "State Regulation of Natural Gas as Exemplified by California" in an academic fashion, choosing not to come to grips with some of the basic rate questions that have been disturbing the western utilities ever since the end of the war.

N. Bernard Gussett, president of Iowa Light & Power Co., represented the utility companies on the panel. C. P. Rather of Southern Natural Gas Co., Birmingham, newly elected president of INGAA, moderated the panel, and Paul Kayser, outgoing president, attempted to tie up the ends of the discussion with an address on "Industry Solutions."

The dinner address by Arnold R. LaForce, third vice president of Metropolitan Life Insurance Co., was a strong condemnation of FPC's new cost-of-money policy, a theme that was repeated from various standpoints in talks given throughout the day.

Several major points were covered by different speakers with differing viewpoints.

* * *

Contract Price

Mr. Payne, expressing his hope that some of the basic differences between royalty owners and pipeline companies can be resolved, declared that the royalty owner will not give up the fight to "secure better treatment at the hands of the now dominant pipeline companies" even in the interests of harmony. While passionately defending free enterprise, they know that in minimum price legislation they are presented with what is probably their most effective bargaining

These new officers were elected at the one-day meeting of the Independent Natural Gas Assn. of America last month. From left to right, they are John F. Merriam, Northern Natural, reelected 1st vice president; J. J. Hedrick, Texas Illinois, 3rd vice president; C. P. Rather, So. Natural, president; Paul Kayser, El Paso, retiring president; and S. B. Irelan (not shown), Cities Service, reelected 2nd vice president.

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Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	8⅝" to 20" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	22" to 30" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser

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weapon for securing relief from an admittedly intolerable price squeeze upon a grossly undervalued natural resource.

The minimum price law which TIPRO sponsored "would effect no statewide minimum price for natural gas. Only in those fields where gas waste could be shown to result from depressed prices paid by pipeline companies could a minimum be set."

Hedrick

"Minimum price must be justified wholly in terms of preventing physical and economic waste," he said. An industry solution is preferable to state regulation, said Mr. Payne, but pipeline companies refuse to recognize that the problem exists.

"The natural gas companies have no quarrel with the states when regulation of price is necessary for conservation," said Mr. Hedrick. "Yet, when such price regulation is once undertaken, the tendency of the state conservation agencies is to increase the price, in my opinion, not as an aid to conservation but purely to increase prices for the sole benefit of producers and royalty owners.

"There will be a market for gas and there will be gas to supply such market only so long as an economic balance between selling and purchase price is maintained.

"Pipeliners are in this intolerable position: gas producers and . . . states are seeking higher prices . . . consumers, consuming states, and regulatory bodies are seeking lower prices for gas sold at the burner tip."

Mr. Payne agreed that regulatory bodies (specifically, the FPC) are at fault, too.

"In a large measure because of dedicated reserve requirements imposed on pipeline companies by FPC, most of our natural gas supply has been tied up on long-term contracts at artificially depressed prices. . . .

"Is it market value when the price is based upon a contract made in, say, 1935, when almost a billion feet of gas a day was being flared in Panhandle field alone for lack of a market?

"The monopoly dictated gas wellhead price . . . is itself serving to promote more federal and state controls."

Said Paul Kayser: "Because of the amount of money involved to construct the line and the length of time required to amortize the investment, these contracts cannot be short-term but must be long-term, in general not less than 15 years and preferably 20 to 25 years. Without these essentials, the pipelines could not be built . . . These contracts are the foundation upon which the market was built. Without them there would be the smothering surplus of gas going to waste without a market in the Southwest.

Payne

"These contracts were made in the light of and under the influence of the laws of supply and demand. The same people who are now so vehemently denouncing these contracts are saying that the market should be permitted to take its normal course under the [same] law, forgetting that that is exactly what the market did at the time these contracts were made . . ."

It is not easy to give an increased price because of the rate troubles involved, he said. His company's approach to the problem: The inclusion of a "favored nation" clause (together with a steadily increasing price of gas paid over the past five years). The clause, effective Jan. 1, establishes one price for the principal producing areas where El Paso buys gas, with all other prices related to this base price, modified by quality of gas and pressures.

"We have established a price . . . of 10 cents for high-pressure, clean pipeline gas, and have related sour gas and low pressure gas to such price based upon the cost of treating and compressing."

Mr. Payne urged the posting of a field price for gas just as is done for oil.

* * *

Underground Storage

"We understand and even applaud some of the fundamental objectives of the [storage] program," said Mr. Payne, speaking for TIPRO. "We, like the pipelines, would prefer that the supply be stabilized to accomplish such objectives as, for instance, the eliminating of the necessity for dumping gas in the summer . . .

"I will not deny that in balking as we did [against the national eminent domain bill] we were looking out for our own interests. I readily admit that we took some delight in being able to take something that the pipelines wanted and fashion it into a weapon to use against them . . . But our opposition . . . extends deeper than that.

"We want to be satisfied that the worthy objectives of such legislation cannot be met . . . in the individual states . . . Too many problems are being carried by Washington. We would like full assurance that the property right of the individual land and royalty owner cannot be disregarded in condemning geological strata for the storage of gas. We would like to know that the legislation cannot be used at some time to store up unlimited quantities of our too-cheap Texas gas—quantities far in excess of the amount needed to stabilize the supply to customers.

"We doubt that the whole program . . . would be economic were it not for monopoly-dictated prices being paid at the wellhead."

Mr. Hedrick: "It should be clear by now that the natural gas companies have turned to underground storage to main-

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tain and sustain their business of transporting gas . . .

"The suggestion has been made that eminent domain is a state function . . . It is clear that the problem cannot be solved on a local scale, or adequately solved by means other than a grant under federal law, such as the present grant of a right to condemn for rights-of-way and compressor stations. As the subject matter is regulated nationally, it is inappropriate to shift the responsibility to the states . . . The public . . . should not be required to await the possibility of state legislation, or be subjected to varying conditions and restrictions that the local interests of a state may deem to be expedient. . . .

"The operation of a storage field by an interstate pipeline company is simply an adjunct of its pipeline operation, and it will be impeded in its purpose if placed under state regulation, for the simple reason that under state law, the tendency will be to regulate for the benefits of local consumers.

"With storage available, there has arisen the problem of determining proper terms and conditions of service with respect to new and old customers —that is, before and after storage . . . whether all customers should pay for the added service on the theory of common benefit or whether those customers who happen to own their own storage should or should not have to pay for the added overall service of the natural gas company caused by the storage."

* * *

The Phillips Case and Extension of FPC Jurisdiction

Mr. Payne said he believes that one issue on which the royalty owners, producers, and pipeline companies can join forces is the tendency of FPC to displace state conservation bodies in regulating independent production and gathering of natural gas.

"In August of last year FPC . . . decided that producers and gatherers such as Phillips Petroleum Co. were not subject to federal control . . . That issue today, unfortunately, is in the hands of the politicians, and it seems abundantly clear that the controls advocates have no intention of sustaining such interpretation.

"Meanwhile, (they) must remain uncertain as to when or where the federal government may reach out and seize their businesses. . . .

"As gas becomes more valuable for limited higher uses, we may confidently expect the pressure for end-use controls to intensify." Mr. Payne cited petrochemical uses and the utilization of gas for production of nitrogen and urea.

"The recent decision of the FPC in the Phillips case does not seem to have alleviated the producers' fear" [of the threat of federal control over production], said Mr. Hedrick. "The producers apparently prefer to sell their gas when they have the opportunity in intrastate rather than interstate commerce."

Brown

Mr. Hedrick went into considerable detail on the extension of FPC controls over many phases of the gas business.

"It is the trend toward supplanting private management by government regulation that gives us the greatest concern . . . In its 1951 annual report, [FPC] proposed that [it] be given additional power to require interconnections between pipelines, allocate gas, control and use, require approval of curtailment of service, provide for enlargement of facilities, suspend rate schedules covering sales for resale for industrial use only, increase rates and services with respect to import and export of natural gas, secure information concerning all gas companies, whether subject to FPC jurisdiction or not, require a certificate when a person constructing facilities will not be a natural gas company . . . and approve security issues of natural gas companies . . ."

Even though these proposals might indicate such power is now lacking, FPC has already conditioned certificates along a number of these points, he declared.

In many cases, too, appeal to courts from FPC rulings is impractical because court appeal "would delay construction of the facilities involved," and deadline dates established in many purchase contracts would cause the contract to lapse.

Nowadays, continued Mr. Hedrick, it is almost impossible for the commission to reach a decision on one application without at the same time deciding one or more of other related applications. This interrelationship necessitates consolidations for hearing, resulting in confusion of issues and delays in resolving them. However, new FPC rules for abridging hearing procedures on uncontested certificate applications and eliminating the need for a certificate for certain minor facilities and emergency operations will help the situation.

The problem stems partly from the unpreparedness of the applicants themselves, he pointed out.

While it is not the fault of the commission but rather of the Natural Gas Act, the commission is "in effect, both the prosecutor, judge, and jury. It is apparent to me that the industry would be better satisfied and the public just as well protected if the commissioners themselves were set aside to act as judge and jury without more contact between them and the staff than that enjoyed by natural gas companies.

"The staff and natural gas companies should be on the same footing in those controversial matters that the commission is required to decide."

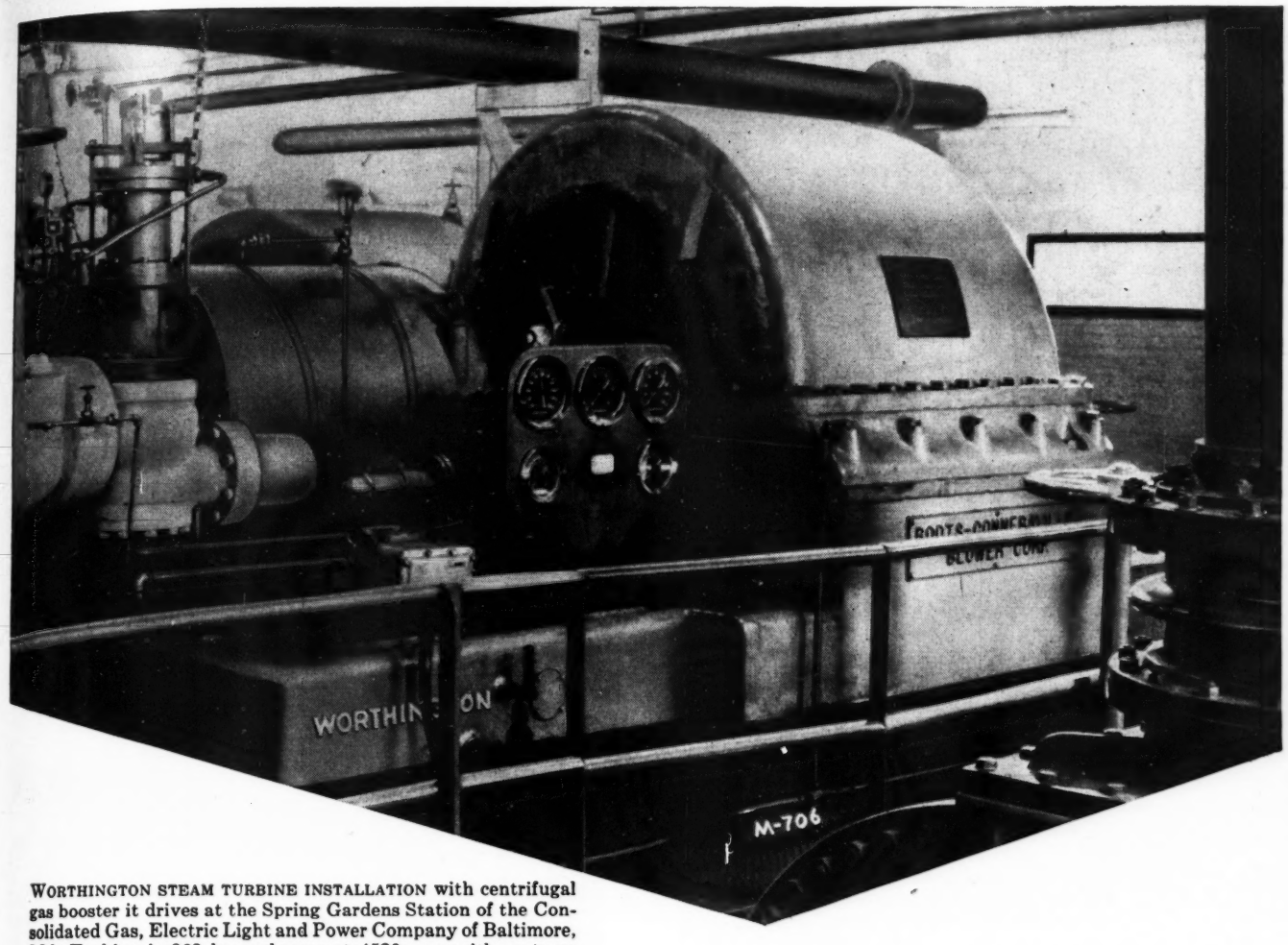
* * *

The OPS and Wellhead Prices

Russell B. Brown held that *"the going field price is far below its intrinsic value, and price controls under these circumstances become growth controls. [They] foster a shortage of gas . . . OPS has gone so far as to change the terms of written contracts . . . by abrogating existing escalator clauses . . . Such action would so disrupt the normal supply program as to greatly endanger the defense activities dependent on gas. It would certainly reduce the available supply to the consumer."*

Mr. Payne expressed similar concern. Said Mr. Hedrick, in agreement:

"Many producers are in a position, by reason of recycling or repressuring, to continue these operations for a comparatively indefinite period of time, awaiting the discontinuance of price controls. In the meantime, tremendous quantities of gas are held off the market . . ."



WORTHINGTON STEAM TURBINE INSTALLATION with centrifugal gas booster it drives at the Spring Gardens Station of the Consolidated Gas, Electric Light and Power Company of Baltimore, Md. Turbine is 868 hp and runs at 4520 rpm with a steam pressure of 140 psig 0°F.S.H. Back pressure: 2 psig.

Consolidated Gas, Electric Light and Power Co. of Baltimore drives important gas booster with this Worthington turbine

To Consolidated Gas, Electric Light and Power of Baltimore, *reliable performance* of all equipment—especially distribution equipment—is a must.

The Worthington steam turbine illustrated above drives a centrifugal gas booster that delivers gas (either natural or manufactured) from storage holders to the gas mains.

Consolidated has a right to expect day-in, day-out reliability of performance from this turbine. They'll get it because built into it is one important ingredient —*Worthington engineering*. With a broad compressor-drive engineering experience, Worthington can design a steam turbine exactly to fit any mechanical-drive requirement. Hundreds of existing installations of all types and sizes prove this point.

Worthington compressor-drive turbines are available up to 25,000 hp—and a wide variety of governors fits them for all operating conditions. For further information, write to Worthington Corporation, Steam Turbine Division, Wellsville, N. Y.

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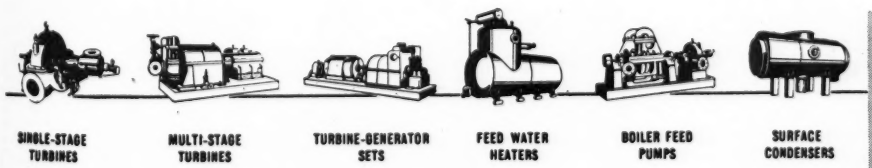


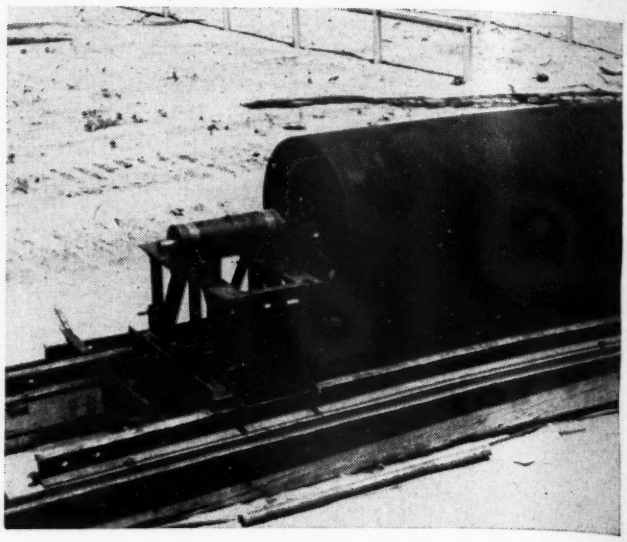
A GREAT TEAM IN STEAM

WORTHINGTON

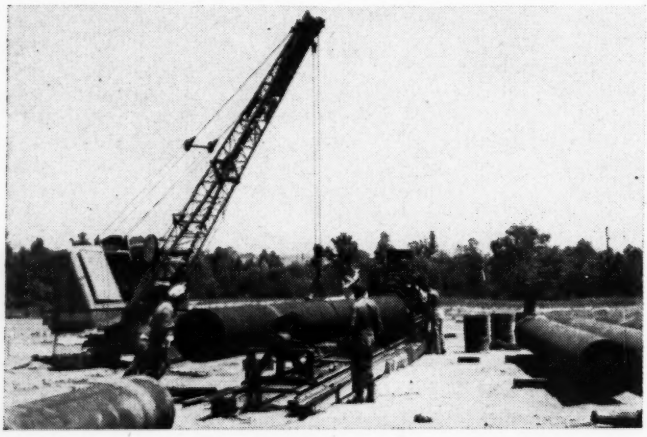
Steam Turbines

Homemade Rig Cleans and Paints in Record Time

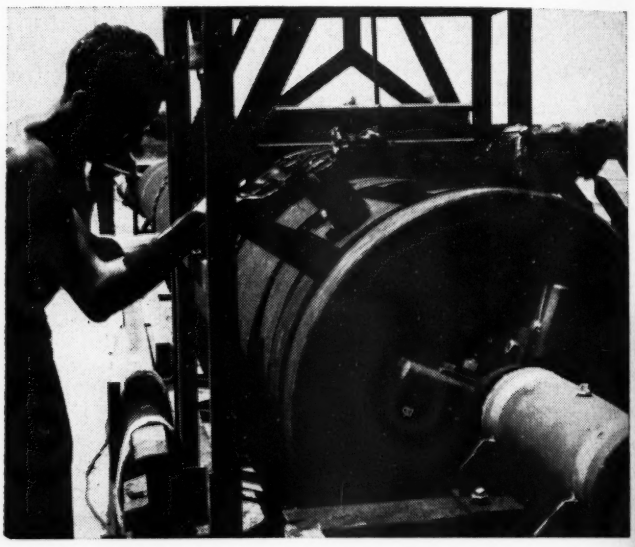
Crew members of Transcontinental Gas Pipe Line Corp.'s District 6 in Anderson, S. C., have built the homemade rig pictured here for cleaning and painting 40-ft sections of 30-in. pipe in record time: from rack through the rig and back to rack of cleaned pipe takes eight minutes. According to Supt. V. R. McGehee, the rig is made up of used materials on hand and each part can be reconverted to its original use if necessary.



At the ends of the rig spiders on axles, working through discarded fin-fan bearings, fit snugly into the ends of the section of pipe to support it and spin it.



Each section of pipe is lifted in and out of the cleaning rig by the dragline used as a crane.

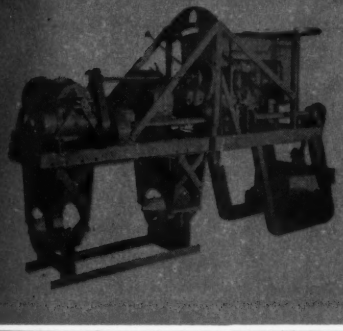


A Transco crewman (above) adjusts the paint brushes while (below) other crew members move the rig along the turning pipe. In the rig are weighted wire brushes to clean the pipe, followed by a spigot dropping paint and more brushes to spread the paint on the revolving pipe.

Superintendent McGehee stands beside the spinning mechanism consisting of an axle connected to a Fordson tractor.

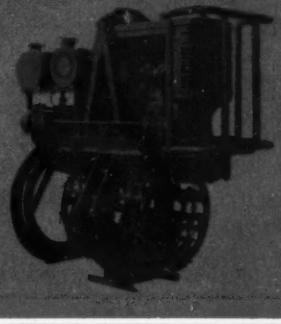
America's finest Pipeline Equipment!

CROSE Auger-Type ROAD BORING MACHINE

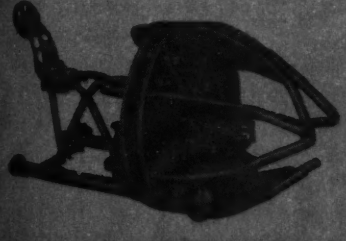


CROSE-LITTLEFORD PIPE LINE KETTLES

CROSE LINE-TRAVELING CLEANING AND PRIMING MACHINE

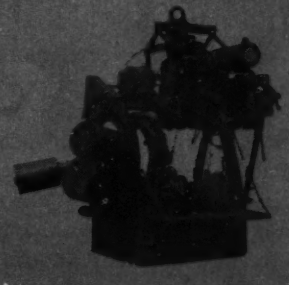


CROSE INTERNAL LINEUP CLAMP



CROSE PIPE CUTTING AND BEVELING MACHINE

CROSE LINE-TRAVELING COATING & WRAPPING MACHINE



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New FPC Rate Theory May Check Industry Expansion

By BILL CLARK

THE illogical new rate theory that allows the FPC to order further rate reductions, or at least to dam the flood of natural gas rate increase requests, has set the gas industry on its collective ear.

The key device in this theory is the commission's "cost of money" concept, which was first laid down in the loaded Opinion No. 228 in the Northern Natural case and reiterated in the Colorado Interstate decision a month or so later. By a specious bit of argument, the FPC managed to hammer down the Northern rate base to give a 5½% rate of return, while Colorado was awarded a 5¾% base.

This deviation from the commission's historic 6-6½% rate is only one of a number of contested points in Opinion 228 and is now awaiting court test in the Eighth Circuit Court of Appeals. Northern Natural, which momentarily is playing the unwilling role of guinea pig for the commission, has also brought into court the commission's decision requiring a dedication of reserves, but as of press time the court's verdict had not been received.

Stocks May Decline

Standard & Poor's, The Value Line Investment Survey, and other financial services were quick to express alarm over the new cost-of-money theory and to hold it responsible, at least in part, for some market recessions in pipeline stocks.

The doctrine works this way: Capital structure is broken down into senior securities and common stock. On the former, the cost of the debt is measured on actual interest costs incurred in the borrowing. The cost of common stock was arrived at by taking the average earnings-price ratio (earnings for the year relative to average market prices for the year) of seven natural gas companies from 1945 to 1951, with consideration given to earnings payout, and allowing the company to earn a similar return on the equity portion of its capital. A figure of 9.25% return on common was used.

Northern's structure is 56% debt and 44% common. Cost of borrowed money was computed at 2.55%; multiplying the 56% debt ratio by this figure gave 1.43%. Multiplying the 44% common equity by the 9.25% fair return figure gave 4.07%. Adding the 1.43 and 4.07 together gave an overall rate of return of 5.50%.

Value Line immediately spotted some glaring weaknesses. Yields on presently outstanding natural gas securities represent the market's evaluation of the return afforded the securities within a regulatory framework dominated by the general acceptance of the 6% overall standard, the company's *Fortnightly*

Arnold R. La Force

Commentary pointed out. "To turn around now and attempt to use these same yields to create a new framework of regulation would mean assuming that such a change would leave the yields undisturbed. It should be obvious from market action of the last month that such an assumption is entirely unwarranted."

The *Commentary* also pointed out that market and book value yields are not interchangeable. "The commission has implied that current prices, if in excess of book values by a wide margin, contain a speculative element. This is assuredly true, and explains why investors have been willing to finance the industry in its amazingly rapid growth. But then the commission argues that these high 'speculative' prices, and the correspondingly low yields, establish a yield criterion that is to be applied to book values, which are lower than market values, in order to determine 'reasonable' return.

"In short, they told that a 'speculative' yield determines the reasonableness of the 'investment' yield."

Earnings Ceiling

Standard & Poor's foresaw several unfavorable possibilities in future market movements. "If carried to its ultimate conclusion, it would tend to limit market movements of natural gas equities," said *The Outlook*. "Also, a definite ceiling is put on per-share earnings potentialities. A rise in the market price of the equity would lower the 'earnings-price' ratio, and thus place the company in a vulnerable position with respect to its rate structure. Contrariwise, a break in its market price would open the door for the company to apply for higher rates. Thus, both earnings-per-share and market price become criteria in rate structures and in problems of raising new money."

Management concern over this new rate theory was evident when the Independent Natural Gas Assn. of America met last month in Omaha. Three speakers dealt with the problem. Both J. J. Hedrick, president of Natural Gas Pipeline Co. of America and affiliates, and Paul Kayser, president of El Paso Natural, dwelt on the bleak prospects of operating under such a rate theory.

Said Mr. Kayser, "If at a time of rising cost of money the rate of return allowed is reduced, such action will check the flow of money that has been available to the industry. Expansion will be checked and service to the public curtailed. . . .

"The commission claims that the formula is based upon well known rate making principles and is calculated to be a sufficient return to yield earnings on the stock that will cause the public to buy the stock freely in the open market, and that such return is arrived at by taking the experience of the principal pipeline companies over the period of 1946-1951.

"But there is a fallacy in this statement. It is simply this: The evidence upon which the rate of return is based was wholly inapplicable to the period in which the rate would be applicable. The yields, earnings, price-ratio data for the seven companies for the period 1946 to 1951 were obtained from the experience of seven companies through that period when the public rightfully or wrongfully understood (1) that a 6% return was generally acceptable to the commission (and it was throughout all of that test period) and (2) that the common stock of each company would have the advantage of the leverage between borrowed money and equity. In addition, the industry went through in that period one of the greatest expansion periods that has occurred in the industry and the public appraised the stocks based not only on earnings and yield but on growth prospects.

"In my judgment this is the greatest problem that faces the industry today."

The reaction of the investor was presented by Arnold R. La Force, vice president of Metropolitan Life Insurance Co.

"The determination of a fair return cannot be reduced to a mere mathematical or arithmetical procedure. Historical cost of money is only one of several factors bearing on the problem, such as risks, the need to attract capital, the trend in conditions and prices, the need to reward efficient management. Application of the doctrine will establish impossible rate-making problems since it is tied to price fluctuations of the stock market. Natural gas pipeline companies will be constantly before the commission for adjustment in the rate of return.

Market Decline

"The decline in the market prices of natural gas pipeline stocks after the Northern Natural and Colorado Interstate decisions has already increased the cost of money for these companies and would justify an application for higher rates.

"While recognizing the importance of historical cost of capital, it is also necessary to give weight to current cost of capital. In financing expansion the current level of interest rates determines the cost of additional money needed."

Compensation or reward for managerial efficiency is not provided in the cost of money doctrine, declared Mr. La Force, and with *every* saving passed on to the ultimate consumer then "the regulatory process will not function to maintain the incentive necessary to motivate private enterprise in the public interest."

Furthermore, under the doctrine the "fair return" would vary directly with the relative proportion of common stock in a company's capital structure, so that different returns would be fixed for companies similar in all respects but the composition of the capital structure. Companies having a higher debt ratio would receive a lower overall return; the resulting tendency would be for the commission to urge greater use of debt.

"The danger of such a policy lies in the fact that it encourages borrowing and higher debt ratios without relation to the financial ability of the industry to support high debt ratios."

Market movements would be limited to a narrow range and the growth factor would be largely eliminated, with price appreciation possibilities therefore greatly restricted, he warned. Stockholders in the higher debt pipelines would be denied the benefits of leverage although this leverage advantage was utilized to attract the necessary equity capital in the original financing of such lines.

Leverage

As an example of "leverage," Mr. La Force cited the experience of 1946 when buyers of common stock of pipelines financed on a 75% debt ratio were willing to pay prices "which on a 6% overall return represented an expected return on common stock two or three years hence of 15%-20%." Upon completion of the line, the market moved upward to a level where earnings return on market value was about 10%. "In other words, the market appraised the 15% to 20% return on book value based on a 6% overall return at a 10% rate, or a market value twice the book value. Now the commission says the company can earn only this market rate of 10% on the *book value* instead of the 15%-20% originally allowed."

Under the new concept, "any market appreciation of stocks would call for an immediate rate reduction; conversely, the only way earnings per share could be increased would be through rate increases made necessary by a decline in the market prices of such stocks." Since declines come with business recession, would the commission raise rates in such a period?

Then, if the market prices should decline steeply and the application of the cost of money formula produced an *overall* return higher than 6-6½%, could FPC bring itself to allow an 8% return, or more?

Or would it revert to the previous concepts of rate-making?

Pipeline News

Northern Natural Plans $70 Million Expansion

In a new application to FPC the Northern Natural Gas Co., Omaha, has requested authority to increase the capacity of its system by 300 MMcf per day to a total of 1112 MMcf. This would enable it to meet the increased demands of its present customers and to serve about 30 communities in Iowa, Minnesota, Nebraska and South Dakota which do not now have natural gas. The total cost of the program, to be carried out over a two-year period, is estimated at $69,826,000.

Planned construction includes about 442 miles of main pipeline additions and numerous branch lines and branch line additions. Plans also call for installation of 73,600-hp capacity in new and existing compressor stations. The facilities would transport gas to be received from the Permian Basin Pipeline Co., Chicago, which has an application pending for construction of a 384-mile system in Texas and New Mexico to bring the gas from the Permian basin for sale to Northern.

According to the company, the first year's construction estimated to cost $45,570,000 would include 226.5 miles of mainline additions and 42,800 hp in compressor capacity. The second year it would build, at an estimated cost of $24,256,000, about 215.1 miles of mainline additions and 30,800-hp capacity in compressor installations. The new facilities would be located in Texas, Oklahoma, Kansas, Nebraska, Iowa, Minnesota and South Dakota.

Supreme Court Vacates Algonquin Certificate

In an important decision last month, the United States Supreme Court upheld the order of a lower court vacating Algonquin Gas Transmission Co.'s certificate of convenience and necessity for the construction of its nearly completed New England pipeline.

The order was originally obtained from a Philadelphia court by Northeastern Gas Transmission Co. and three other companies and has the effect of returning the case to the FPC for further hearings, and reopening the question of one pipeline for New England or two.

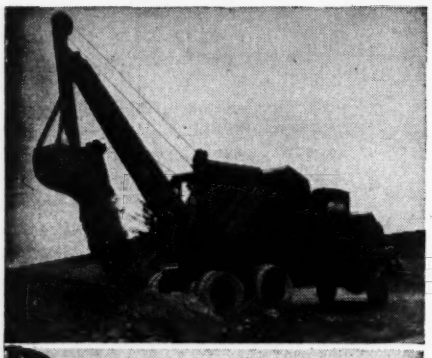
Algonquin, which has fought and won legal battles with many communities and property owners along its 2000-mile pipeline (see October *GAS*), may be stripped of its rights of eminent domain by the decision and, as *GAS* went to press, property owners on one side and the company on the other were scrambling for legal advantage with announcements of motions, appeals, injunctions, stays, and other forms of legal warfare.

The elated property owners say that the Supreme Court's action will allow them to

all 3 jobs!

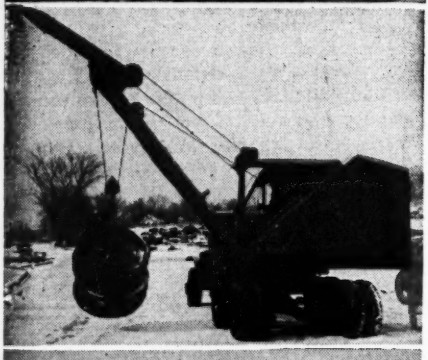
for less than $6500.00

(Less truck and mounting charge, F. O. B. Waverly, Ia.) Price includes complete hoe unit with boom, stick and bucket, plus crane adaptor and backfill blade. Price subject to change.



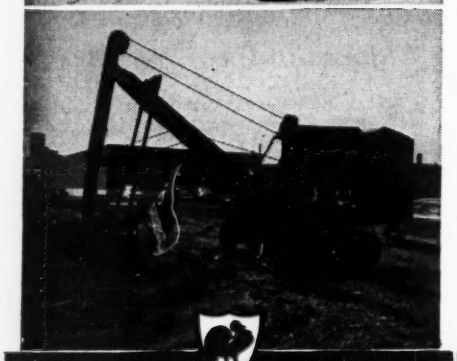
1 Trenching!

Low-cost Bantam Back Hoe mounts on new or used truck . . . drives anywhere over paved roads, black top or off-highway in a hurry . . . maneuvers in close quarters and soft spots where bigger machines can't go . . . *digs up to 100′ of 5′ trench per hr.* with 20″, 25″ or 30″ bucket . . . works to 14′ depth.



2 Hoisting!

Simple crane adaptor converts Bantam hoe to *2½-ton crane* (less outriggers or counterweights) in 15 minutes on the job. Uses same boom and same one-man operation for lowering pipe, valves, etc. . . . saves bringing in "high-lifts" or side-boom tractors for unloading trucks, placing tanks, etc.



3 Backfilling!

To close trench, operator simply hooks on fast-change Bantam backfill blade . . . *covers up to 350′ of trench per hr.* Big 5′ x 2′ blade has maximum reach of 23½′ . . . works to within 6½′ of machine . . . has unique parallel linkage for fast "dozing" action.

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The *LOW-COST* machine with the *BIG* work range

treat the company's workmen and its lines and equipment as trespassers. Their lawyers were working on motions asking for the removal of both the workmen and the pipes, and they are also planning to seek damages from the company.

In Danbury, Conn. the town counsel announced that town officials are weighing a court action to have the pipeline removed from under the town's roads. The line was laid across the Danbury water mains and under its roads late in September after the courts had upheld a ruling of the Connecticut Public Utilities Commission authorizing the construction. The commission's order was vigorously contested by city officials at the time.

In addition to the city's protest, a large number of property owners in the area waged an unsuccessful fight to keep the line from crossing their land. They are attempting now to have the court order vacated that gave Algonquin occupancy of their lands.

An attorney for Algonquin said that the company would apply immediately to the Supreme Court for a rehearing and further stay of the order of the lower court. Such requests are rarely granted, however. The company will ask the FPC to grant a new temporary certificate, and in spite of the setback, will continue with construction on schedule.

Canadian Board Approves Westcoast Export Plan

Final Canadian approval was granted last month for the construction of Westcoast Transmission Co.'s proposed line from northern Alberta and British Columbia to the Pacific Northwest by the Board of Transport Commissioners.

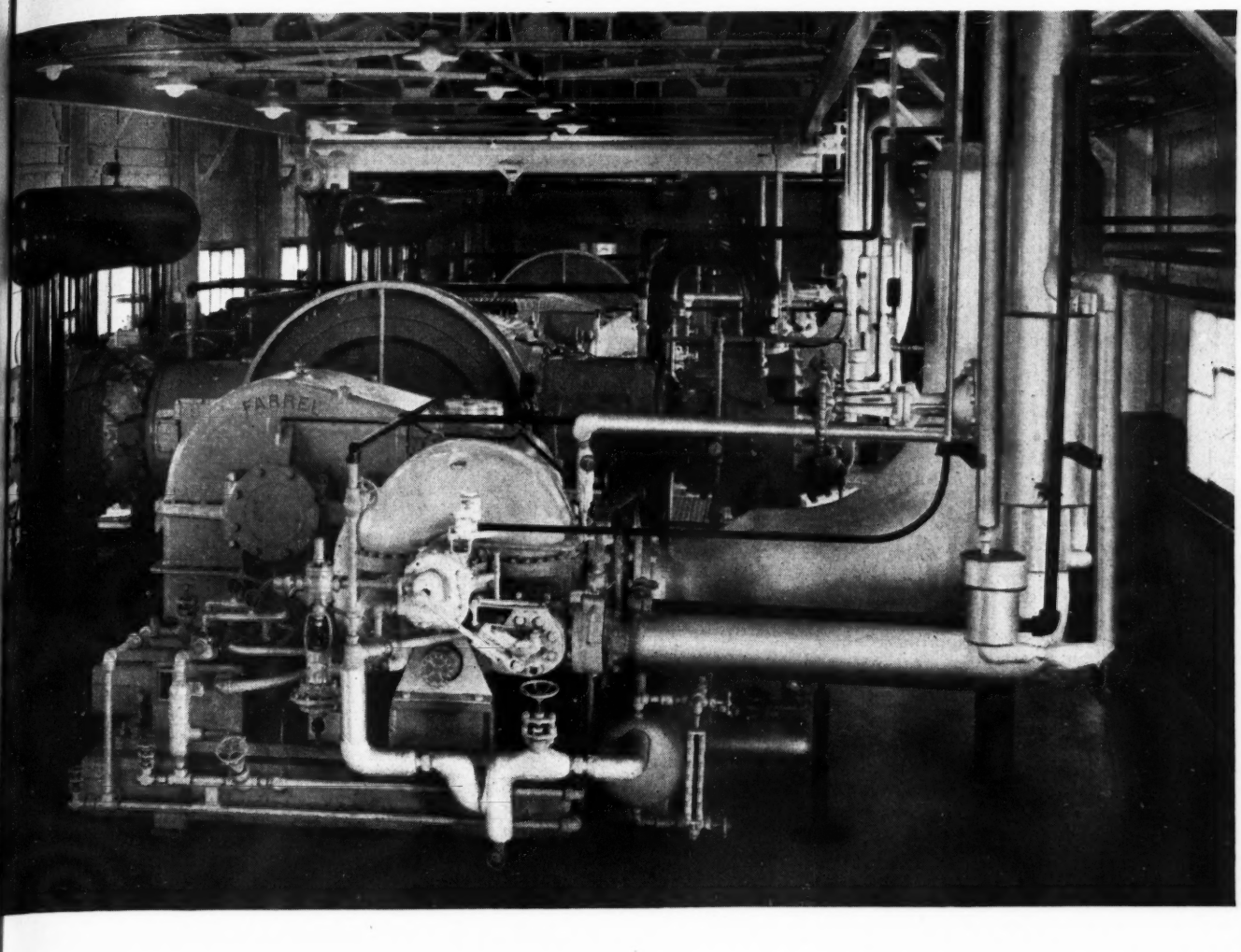
Now, the only remaining obstacle to the building of the line is FPC approval. Westcoast has had an application pending before that board for some time but hearings were suspended because the company did not have Canadian approval.

Earlier, the Canadian board had given tentative authorization for the project provided that a survey would disclose enough reserves in the Peace river area to justify the line. The survey indicated reserves of 2,506,000 MMcf and on that basis the authorization was given.

Westcoast officials have said that if approval is obtained from the FPC this year, construction of the line could be completed by mid-1954. The Canadian authorization specifies completion by Oct. 31, 1955.

However, Westcoast is competing with four other companies before the FPC for permission to import Canadian gas. Commissioner Dale Doty recently made a special trip to Canada to investigate the feasibility of the proposed lines. In addition, there is the application of Pacific Northwest Pipeline Co. for a line from New Mexico to the northwest to contend with.

Opposition to the Westcoast line also comes from the northwest itself. Henry Gellert, president of Seattle Gas Co., the largest utility in the state of Washington, and a must market in any plan to export gas from Canada, said recently: "I am convinced that there is no way of getting a firm, adequate cheap supply of gas from Canada at this time. We have been denied by the Canadian government entry into their



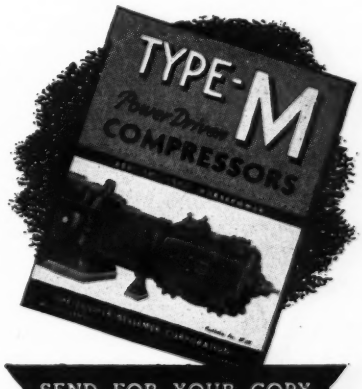
The units shown above are Cooper-Bessemer M-Line compressors in Continental Oil Company's Billings Refinery. They are turbine driven, with reduction gears, and are handling vapor and recompressor gas through 2 stages, from 17 psi to 253 psi discharge.

During their two years of continuous operation, these units have shown a typical M-Line record — smooth, trouble-free performance, minimum down time and completely satisfactory behavior in general.

The reasons are simple. Combined in these units are many of the features that have contributed to the success of Cooper-Bessemer engine-driven horizontals and modern V-Angles — features that come only from years of practical experience and painstaking development work in compressor design and construction.

If you have new jobs coming up requiring either motor or turbine driven compressors get all the facts on modern Cooper-Bessemers. They are available in sizes from 250 to 5,000 horsepower.

This new bulletin covers the main features of the turbine and motor driven compressor units, from 250 to 1,000 hp. It is yours for the asking.



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by **Cooper-Bessemer**

MOUNT VERNON, OHIO AND GROVE CITY, PENNA.

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lush fields in central and southern Alberta and have been told that the only place we can get gas is from the sparse fields in distant northern Alberta and British Columbia.

"It would be suicidal for us" he said, "to accept the position of a captive market to our Canadian friends, being forced to spend $150 million or thereabouts to develop the wastelands of Northern Canada."

Gellert also contends that the reserves in the Peace river area are inadequate and that the route proposed by Westcoast involves serious physical difficulties.

Northeastern Completes New England Line

Northeastern Gas Transmission Co. is now delivering natural gas to all the 35 New England gas utility systems it has been authorized to serve by FPC, following completion of its 515-mile pipeline system in Massachusetts, Connecticut and New Hampshire, it was announced last month.

Construction of this system began in the spring of 1951. From its connecting point with its parent company, Tennessee Gas, the Northeastern line was constructed eastward across Massachusetts. By September of 1951 the first natural gas service in New England's history was begun*.

Nicknamed "Tuxedo Inch" or "The Gold Coast Line" by members of the Bechtel construction crews because of the large number of wealthy landowners along the route, the project involved a combination of difficulties almost unmatched in the history of pipelaying. They included a mass of local ordinances and special regulations for the control of pipeline activities, problems of obtaining the right of way through country estates and populous suburbs, having jobs spread out over 11 locations, and limitation to a 50-ft right of way (about one-half of the usual working space).

The picturesque New England countryside brought no joy to the hearts of the line builders either. For example, they had to "cross" about 1300 rock fences—"crossing" in this case meaning the removal of a strip about 50 ft wide, laying the line, and then replacing the fence in the "original condition."

Of the total of 225 miles of line laid this year, an unusually high percentage of clearing was required; the terrain was almost all rock and boulders with numerous swamps. Some of the most difficult crossings were made under the famous Merritt parkway with its fast traffic and rock ground condition. And some of the hillsides were so steep that it was necessary to team two tractors to work in tandem.

Throughout the work, Northeastern and Bechtel attempted to follow a policy of causing as little inconvenience as possible and of minimizing disruption of local economy. The pipeliners erased virtually all traces of their work as they passed. Work through farm lands was timed as much as possible to avoid interfering with crops and highway crossings were made at top speed to avoid tying up traffic for any length of time. The success of this policy is shown in the on-schedule completion of the line and in the lack of "incidents" and complaints from local residents.

*GAS last month erroneously stated that Torrington, Conn. was the first city in New England to receive natural gas. Actually it was the first city in Connecticut.

Missouri Public Service Plans 136-Mile System

The Missouri Public Service Co., Warrensburg, has applied to the Federal Power Commission for authority to contruct a 136-mile system consisting of 109.3 miles of 8 and 10-in. pipe and 27.1 miles of lateral lines all in Missouri. The application also asks FPC to order Panhandle Eastern Pipe Line Co., Kansas City, to supply it with natural gas.

The proposed project, estimated to cost $5,080,845, would connect with Panhandle's system near New Franklin, Mo. and extend northwest through Howard, Chariton, Linn, Livingston, and Grundy counties. Fifteen communities would be served natural gas for the first time. The company estimates that the maximum and minimum day demands, excluding industrial loads that will be carried by the proposed system, will be 20,176 Mcf and 6816 Mcf respectively.

FPC Jurisdiction Disputed

Whether or not the FPC has jurisdiction over the Iowa-Illinois Gas & Electric Co. has become the main issue in the company's application to build a new pipeline in Iowa. The proposed $500,000 project would carry gas from the Natural Gas Pipeline Co. of America's system in Mahaska county through a 22-mile pipeline to a point in Wapello county.

Iowa-Illinois has contended for years that it does not come under FPC jurisdiction because it is strictly a distributor although the commission has ruled that it has jurisdiction over distribution. Attorneys for the company and the commission were to present their arguments in written briefs to Examiner Frank A. Hampton before Oct. 21.

Work on the Northeastern line as it appeared to a Bechtel cartoonist.

United Fuel Asks Okay To Expand Storage Facilities

The United Fuel Gas Co., Charleston, has applied to FPC for authority to construct natural gas pipeline facilities in West Virginia to help expand its underground gas storage operations. The project is estimated to cost $6,088,890.

Plans for expansion include 50.5 miles of pipeline which would extend south from a proposed 2640-hp compressor station in Wood county to the company's existing Lanham station in Putnam county, W. Va. The new compressor station would be located at an existing storage pool and would be used to compress gas for injection into and withdrawal from the pool.

In the same request, the company is asking authorization to acquire leaseholds, drill wells and install well and field lines in connection with initiating operation of a new storage pool at an estimated cost of $1,885,800. The application says the new compressor facilities also would be used in conjunction with operation of the new pool.

Six Columbia Subsidiaries Seek Approval of New Lines

Six Columbia Gas System subsidiaries have filed applications requesting authority to construct additional natural gas pipeline facilities, and one, Manufacturers Light & Heat Co., is seeking approval to acquire the facilities of Cumberland & Allegheny Gas Co.

Manufacturers, Natural Gas Co. of West Virginia, Cumberland & Allegheny, and Home Gas Co., all of the Pittsburgh group, propose to build about 279 miles of pipeline and to retire about 178 miles of line and certain compressor facilities in Pennsylvania, West Virginia, Maryland and Ohio. Atlantic Seaboard Corp. and Virginia Gas Transmission Corp., of the Charleston group, have asked authority to install 16,600 hp compressor capacity in new stations and 1760 hp in additions to four existing stations. Estimated cost of the projects is $11,140,447 for the Pittsburgh group and $6,885,600 for the Charleston companies.

Proposed projects for the various companies include: Manufacturers — to construct 194 miles of line and retire 171 miles in 19 counties of Pennsylvania, West Virginia, and Ohio, and to retire 440 hp in compressor units at a station in Fayette county, Pa.; estimated cost, $8,250,079.

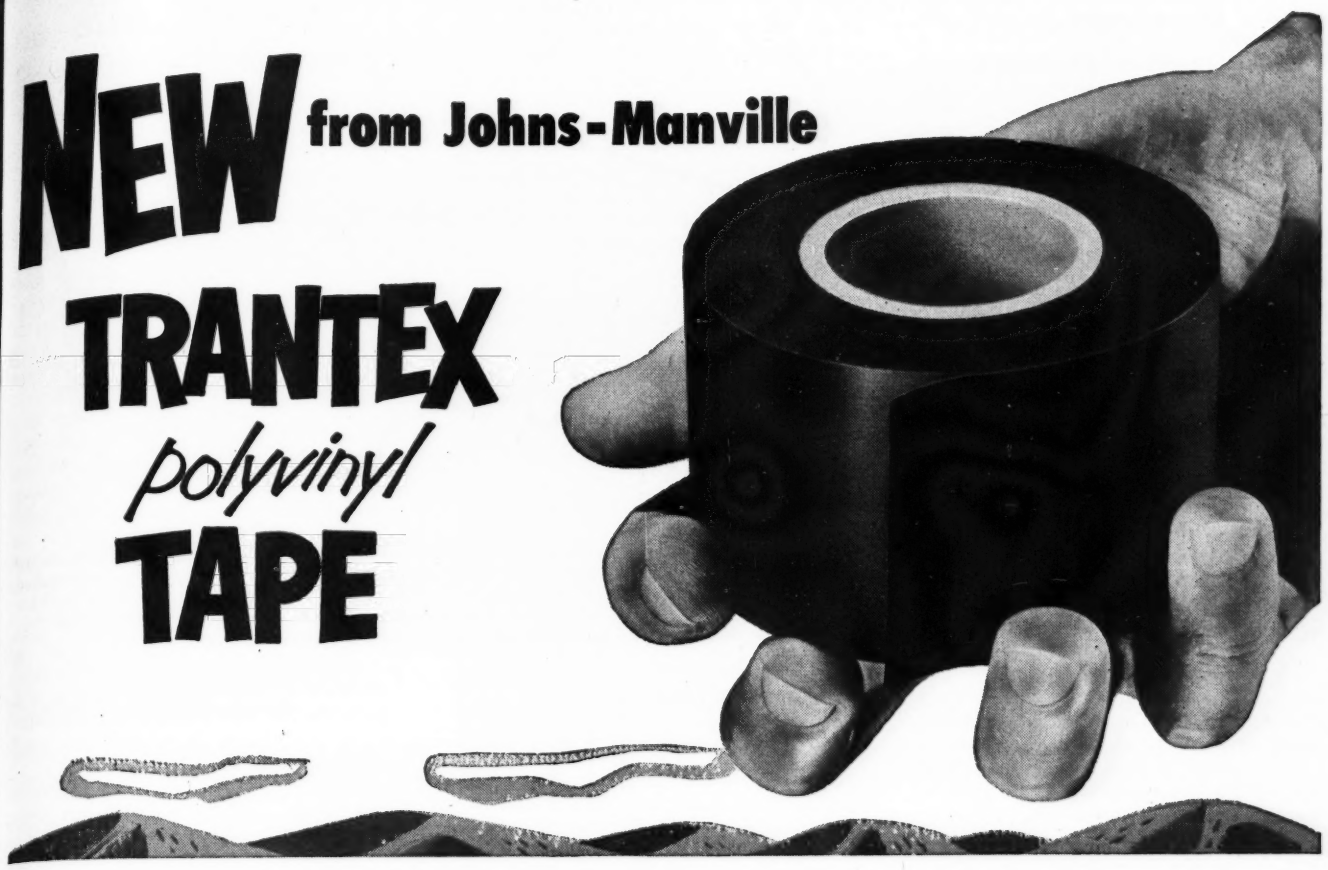
Natural Gas Co. — to construct 7.46 miles of line and retire same amount in Columbiana county, Ohio; estimated cost $77,068.

Cumberland & Allegheny — to build 31.2 miles of line in Maryland and West Virginia and abandon 75 hp in compressor units at a station in Preston county, W. Va.; estimated cost, $1,104,909.

Home Gas — to build 46.7 miles of line in Tioga and Broome counties, N. Y., and abandon 180 hp in compressor units at a

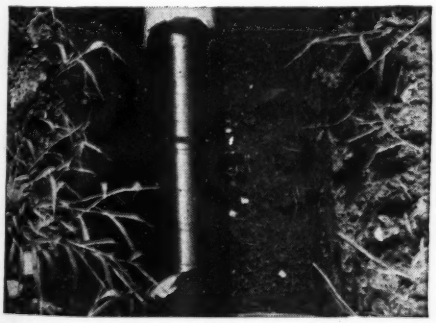
NEW from Johns-Manville

TRANTEX *polyvinyl* TAPE



. . . a cold applied wrap that protects underground and overhead oil and gas lines from corrosion

Tough, corrosion-resistant Trantex Tape is used here to repair holidays in the line. Easily applied, it is an economical material for this service.



For the field joints of this transmission line, Trantex Tape is used to give these critical spots lasting protection against corrosion.

FOR more than fifty years Johns-Manville has been manufacturing pipeline protection material. This experience, plus the knowledge gained in the research laboratory and in the field about the effects of corrosion, have gone into the making of "Trantex"—a new plastic tape for extending the service life of oil and gas lines.

Trantex needs no special equipment in its application. It is easily applied by hand or hand-operated devices. A pressure-sensitive adhesive forms a tight bond with the pipe—shields it against the general corrosive conditions that cause most pipeline failures. Trantex has proved remarkably resistant to the effects of soil chemicals, acids, alkalies, alcohols, oil and grease, sunlight and aging.

Check the basic properties of Trantex in the table below—each one is extremely important in the control of corrosion.

For more detailed information about Trantex *polyvinyl* Tape, write to Johns-Manville, Box 60, New York 16, N. Y.; in Canada, 199 Bay Street, Toronto 1, Ont.

	*V-10	**V-20
Dielectric Strength per mil thickness, Approx.	1,000 V	1,000 V
Insulation Resistance, greater than (ASTM-D-257-49)	100,000 megohms	100,000 megohms
Operating Temperature	200 F	200 F
Adhesion	30 oz per inch	20 oz per inch
Tensile Strength	30 lbs per inch	56 lbs per inch
Elongation at Break	250%	300%

"Trantex" is a black polyvinyl tape. It is available in two thicknesses—
*V-10 is a 10 mil tape for general conditions, and
**V-20 is a 20 mil thickness for use where a more rugged coating is specified.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville TRANTEX *polyvinyl* TAPE

PROTECTS PIPELINES AGAINST CORROSION

station in Broome county; estimated cost, $1,708,400.

Atlantic Seaboard and Virginia Gas would build three new compressor stations on their 26-in. transmission line between Clendenin, W. Va. and Rockville, Md.; supercharge three existing units from 880 hp to 1100 hp and install an 1100-hp unit at an existing station in Hardy county, W. Va. The new facilities would be a 5000-hp station in Braxton county, W. Va.; a 6600-hp station in Upshur county, W. Va.; and a 5000-hp station in Shenandoah county, Va. The increased capacity would supply an additional 86.2 MMcf on a peak day to meet requirements of present customers.

In the application covering the proposed merger, Manufacturers asks authority to acquire all of Cumberland & Allegheny's property and facilities, which include about 113 miles of transmission line and numerous laterals between Cumberland, Md. and Lewis county, W. Va.

Peoples Gas Seeks to Buy Shares of Chicago Company

The Peoples Gas Light & Coke Co., Chicago, last month filed a petition with the Illinois Commerce Commission, Springfield, asking authority to purchase an additional 265,370 shares, at $12.81 per share, of the capital stock of Natural Gas Pipeline Co. of America, one of its subsidiaries.

The directors of Natural Gas Pipeline Co. have authorized the issuance and sale of these additional shares for an aggregate consideration of $3,399,995 "to provide funds for expansion of its facilities and for other corporate purposes." The additional shares have been offered to Peoples Gas.

At least a part of the capital thus provided Natural Gas Pipeline will probably be invested in the Herscher Dome storage development, a joint project of Natural Gas Pipeline and Texas Illinois Natural Gas Pipeline Co.

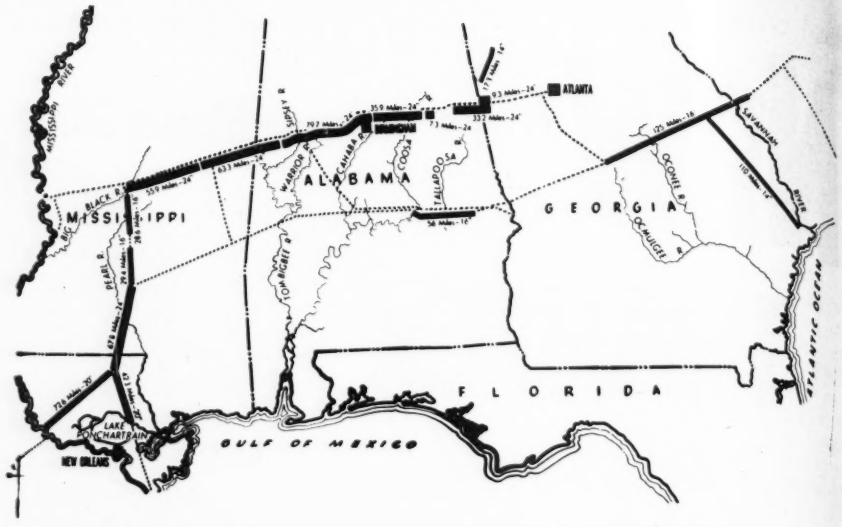
Colorado Court Will Test Authority of New Agency

A trial involving $217 million worth of oil—perhaps the largest sum ever at stake in a Colorado lawsuit—has been set for November in Denver district court.

The case is the first court test of the authority of Colorado's new petroleum regulation agency, the state oil and gas conservation commission. Three companies are suing the commission seeking cancellation of its order ending the flaring of natural gas from oil wells in the Rangely field in northwestern Colorado and requiring that all excess gas produced there be pumped back into the ground.

Suing the state are Sharples Oil Corp., Texas Co. and the Union Pacific Railroad, in two separate suits. Texas Co. operates the railroad's leases in the field. The plaintiffs contend that the state commission exceeded its authority in ordering that gas produced incidental with oil output be returned to the producing horizon.

Warwick Downing, commission chairman, said all other operators in the Rangely field, Phillips Petroleum Co., California Co. and Stanolind Oil & Gas Co., are in favor of the reinjection order but have not intervened in the suit.



This map illustrates the expansion program planned by Southern Natural during 1952-53. The solid lines show the location of loops and new lines to be constructed by Houston Contracting Co. Ltd. and H. C. Price Co. The dotted line indicates Southern Natural's existing route, along the proposed construction west of the Mississippi river and south of Lake Pontchartrain, plus its South Carolina extension.

Price, Houston Share in Southern Natural Contracts

Houston Contracting Ltd. of Houston and H. C. Price Co. of Bartlesville, Okla., have been awarded contracts by Southern Natural Gas Co., Birmingham, Ala., covering the construction of 833.4 miles of loop and new lines in Louisiana, Mississippi, Alabama, Georgia, and South Carolina.

The work contracted by the two construction companies covers an important phase of the $76 million construction program planned by Southern Natural during the next three years. The 1254 miles of new pipeline and 22,250 hp in compressors to be added to Southern Natural's present system will enable the company to increase its daily delivery of natural gas to 1020 MMcf by 1954.

Two spreads of Houston equipment are at work on 88 miles of mainline loops. This portion of the Southern Natural project recently received an emergency authorization from the Federal Power Commission.

The Price company hopes to have two spreads in action on the Southern Natural job early next year, and a total of four crews will be assigned to the project by Houston next year. Completion date for the entire 833 miles is scheduled for Dec. 1, 1953.

Meanwhile, the FPC acted to speed its final decision on the authorization of the complete Southern Natural project. On a motion by the company, the commission ordered the intermediate decision procedure omitted. This means that a portion of the case will be decided directly by the commission without the filing of a decision by the presiding examiner.

Utah Natural Amends Plan To Serve Salt Lake Area

The Utah Natural Gas Co., Salt Lake City, is seeking approval of the Utah Public Service Commission for a proposed 20-in. pipeline to extend 125 miles from the Clear Creek natural gas field in Carbon county, Utah to Salt Lake City. John A. McGuire, president of the company, has expressed the hope that the $10 million pipeline, to have a capacity of 100 MMcf per day, will be under construction by next spring.

The company had previously requested commission approval of a 450-mile pipeline to carry gas from the San Juan basin in the "four corners" area to Salt Lake City. Changes in the petition were made following recent completion of the company's fourth commercial scale well in the Clear Creek field. Mr. McGuire said reserves of about 350,000 MMcf would insure a 20-year supply at a delivery rate of approximately 50 MMcf per day.

Crose Manufacturing Buys Standard Magnesium Plant

The M. J. Crose Manufacturing Co. Inc., Tulsa, one of the world's largest manufacturers of pipeline construction equipment, recently purchased the manufacturing facilities and plant of the Standard Magnesium Corp., Tulsa. The plant will be known as the Standard Magnesium division of the company and will add magnesium anodes to the list of pipeline installation and repair facilities manufactured by Crose.

Operation of the plant started early last month. Manufacturing facilities available will enable the company to make all types of magnesium anodes for cathodic protection of buried and marine metal structures, including special sizes and shapes. A new feature will be marking of a spectrographic analysis on each group of magnesium anodes shipped. D. M. Curran, secretary-treasurer of Crose, said this will assure the buyer of controlled, high quality anodes that will provide better protection from corrosion.

A new managerial staff will guide the Standard Magnesium division activities. Manager of the new division is Hartley Davis, while Hugh Brady will be chief engineer in charge of engineering and installation. It will employ some 25 people and will market nationally through the Pipeline Anode Corp. Yale Titterington, formerly with Dow Chemical Co., will be sales manager of the Pipeline Anode Corp.

More Work on Oakford Storage Wells Authorized

FPC has authorized New York State Natural Gas Corp., New York, and Texas Eastern Transmission Corp., Shreveport, to carry out additional drilling, plugging and reconditioning of wells at their joint underground storage project in Westmoreland county, Pa.

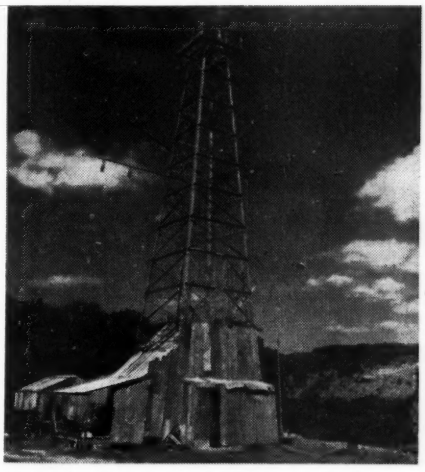
The Oakford storage project as originally authorized in November 1950 was estimated to cost over $40 million and specified a total of 211 wells to be drilled, plugged, reworked and reconditioned during 1950, 1951 and 1952.

In June 1952, the companies asked the FPC to modify the earlier authorization to permit them to drill only 59 new wells, instead of 60, to rework an additional 32 wells, replug an additional 20 abandoned wells, and recondition an additional 111 abandoned wells, bringing the total to 373 to be worked. Cost of this additional well work is estimated at $2,600,000.

New York Natural Well Breaks World Record

New York State Natural Gas Corp. is currently drilling the deepest cable-tool well in the world in New York. Depth of the well, located 18 miles northeast of Elmira and 18 miles south of Ithaca, has exceeded 10,666 ft, and it is anticipated that drilling may continue to 11,000 ft or more. The previous world record of 10,312 ft for a well drilled by the cable-tool method was established by Manufacturers Light & Heat Co. in the Barton well in Summit gas field, Fayette county, Pa.

New York State Natural geologists point out that even though the Kesselring well—a wildcat well in a pioneer area—may not prove to be a producer of gas, much will be gained in new and valuable geological information.



The Kesselring well, deepest ever drilled by the cable-tool method, is a current project of New York State Natural Gas Corp. On Sept. 19 the well was drilling at a depth of 10,666 ft.

PROGRESS REPORTS

Planned

ATLANTIC SEABOARD CORP. and **VIRGINIA GAS TRANSMISSION CORP.,** Charleston, W. Va. Docket G-2062 for 5000-hp compressor station in Braxton county, W. Va.; 6600-hp station in Upshur county, W. Va.; and 5000-hp station in Shenandoah county, Va.; supercharging 3 units from 880 hp to 1100 hp and installation of one 1100-hp unit at existing station in Hardy county, W. Va.

CAROLINA NATURAL GAS CORP., Charlotte, N. C. Docket G-1956 for 40 miles of line to connect with Transco line near Kings Mountain, N. C., extending to Rock Hill, S. C., with laterals to four South Carolina points.

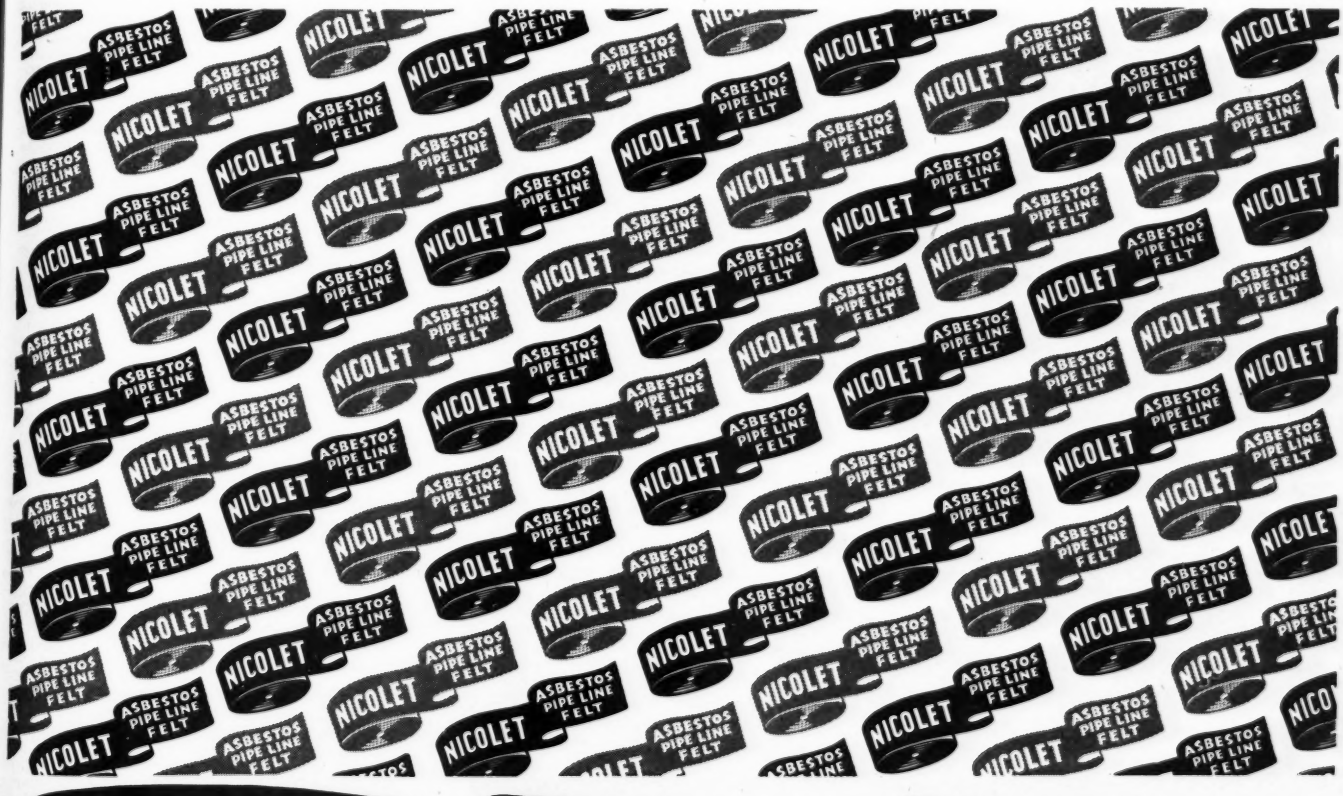
CENTRAL WEST UTILITY CO., Kansas City. Docket G-1682, four alternate plans to serve Clay county, Mo.

CHATTAHOOCHEE NATURAL GAS CO., Birmingham. Docket G-2066 for 70 miles of line in northwest Georgia, to connect with system of Southern Natural in Floyd county.

CITIES SERVICE GAS CO., Oklahoma City. Docket G-2038 for installation of 11,440 hp compressor capacity—three 1600 hp units to be added to its Greensburg station, Kiowa county; six 1100 hp units in a new station in Harvey county.

CONNECTICUT GAS CO., Berlin. Docket G-1954 for 3 short pipelines, totaling about 2 miles, to extend from Connecticut Light & Power gas plants to Algonquin Gas Transmission Co. from plants at Waterbury, Willimantic and Putnam, Conn.

CUMBERLAND & ALLEGHENY GAS CO., Pittsburgh. Docket G-2059 for 31.2 miles of line in Garrett and Allegany counties, Md. and Mineral county, W. Va. and retirement of 75 hp in compressor units at station in Preston county, W. Va.



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EAST TENNESSEE NATURAL GAS CO., Knoxville. Docket G-1336 for a 100-mile, 16-in. line from near Knoxville to Kingsport, Tenn. with appurtenant equipment.

FREDERICKSBURG NATURAL GAS CO., Fredericksburg, Va. Docket G-2041 for 28½ miles of 4¼-in. line and .72 mile of 3½-in. line connecting with Transco line, extending to Fredericksburg and area.

GLACIER GAS CO., Butte, Mont. Dockets G-1816, G-1817, G-1818 for 285 miles of 20-in. from northeast of Kalispell, Mont. to Spokane, Wash.; 91 miles of 8⅝-in. from Spokane to Lewiston, Idaho; 120 miles of 16-in. from Spokane to Hanford, Wash.; 130 miles of 12¾-in. from Spokane to south of Trail, B. C.

GULF INTERSTATE GAS CO., Houston. Docket G-2058 to construct 860 miles of 30-in. line from Point Rayne, La. to Boyd county, Ky., 229 miles lateral lines and five 8000-hp compressor stations.

HOME GAS CO., Pittsburgh. Docket G-2059 for 46.7-mile pipeline in Tioga and Broome counties, N. Y. and retirement of 180 hp in compressor units at a station in Broome county.

INDIANA GAS & WATER CO. INC., Indianapolis. Dockets G-1813 and G-1937, for 19 miles of 8-in. paralleling Panhandle Eastern Pipe Line's lateral between Panhandle mainline and Crawfordsville; 13 miles of 6-in. paralleling Panhandle lateral from its mainline to Lebanon; both lines to be operated by Panhandle.

KANSAS NEBRASKA NATURAL GAS CO., Hastings. Dockets G-1857 and G-1970. To build 179 miles of line in Kansas and Nebraska and rearrange certain compressors, stub lines and metering stations to serve new mainline industrial customers; and substitution of 49 miles of 10¾-in. line for 52 miles of 8⅝-in.

LONE STAR GAS CO., Dallas. Docket G-2005 for a 2640-hp compressor station and 5 miles of 12-in. line to New York City field reservoir, Clay county, Texas.

MANUFACTURERS LIGHT & HEAT CO., Pittsburgh. Docket G-2059 for 194 miles of line and retirement of 171 miles of line at points in Pennsylvania, West Virginia and Ohio; retirement of 440 hp in compressor units at station in Fayette county, Pa.

MISSOURI CENTRAL NATURAL GAS CO., Macon, Mo. Docket G-1509 for 25 miles of 6-in. from Moberly to Macon, Mo.

MORGANFIELD NATURAL GAS CO., Morganfield, Ky. Docket G-1935 for a 31-mile, 4- and 6-in. line lateral to proposed Texas Gas Transmission Corp. line, to serve 6 Kentucky communities.

NATURAL GAS CO. OF W. VA., Pittsburgh. Docket G-2059 for 7.46 miles of line and retirement of same amount in Columbiana county, Ohio.

NEW YORK STATE ELECTRIC & GAS CORP., Ithaca. Docket G-1999 for total of 49 miles of pipeline; 25 miles 10-in. from DeRuyther to Norwich, N. Y., 24 miles 8-in. from Norwich to Oneonta, N. Y.

NEW YORK STATE NATURAL GAS CORP., Pittsburgh. Docket G-1980 (in part) for a 75-mile, 20-in. line from southern end of Driftwood field line to main dual line in Armstrong county, Pa.; contract for 29 miles of 20-in. line let to Williams-Austin Co., construction scheduled to begin Nov. 1; 75-mile line to be constructed in 1953.

NORTHERN NATURAL GAS CO., Omaha. Docket G-1918 for 400 miles of 24-in. pipe from the United States-Canadian border to a point near Minneapolis and two compressor stations with 5280 hp each.

NORTHERN NATURAL GAS CO., Omaha. Docket G-2009 for a 6.5 mile 30-in. loop line from Bushton, Kan. compressor station, northeasterly to a point in Ellsworth county; a 1.4 mile 8⅝-in. branch line from its Omaha branch line to a proposed regulating station near La Platte in Sarpy county, Nebr.; a 1320-hp addition to Hugoton, Kan. compressor station.

NORTHERN NATURAL GAS CO., Omaha. Docket G-2063 for 442 miles of mainline additions to connect with Permian Basin Pipe Line Co. system, and 73-600-hp in new and existing stations in Texas, Oklahoma, Kansas, Nebraska, Iowa, Minnesota and South Dakota. Also 475 miles of branch lines and additions to serve customers in Iowa, Minnesota, Nebraska and South Dakota.

NORTHWEST NATURAL GAS CO., New York. Docket G-996 for 1296 miles of 18-, 20-, 22-, and 24-in. line in Washington, Idaho, Oregon and British Columbia, together with laterals and four compressor stations aggregating 27,500 hp.

OHIO FUEL GAS CO., Columbus. Docket G-2013 for 34.5 miles of 20-in. loop in Ohio. Construction tentatively scheduled to begin March 15, 1953.

PACIFIC NORTHWEST PIPELINE CORP., Houston. Docket G-1429 for 1384 miles main line; 316 miles of spur and lateral lines; and 8 compressor stations totaling 61,000 hp, to extend from Ignacio, Colo., in the San Juan basin, to Bellingham, Wash. (Seattle area).

PERMIAN BASIN PIPELINE CO., Omaha. Docket G-1928 for a 384-mile line from Upton county, Texas, through Lea county, N. M., north to Roosevelt county, N. M., and northeast to Carson county, Texas, connecting with facilities of Northern Natural Gas Co.

SHENANDOAH GAS CO., Lynchburg, Va. Docket G-1448 for 39 miles of line from a point near Middletown, Va. to points near Winchester, Va. and Martinsburg, W. Va.

SOUTH CAROLINA NATURAL GAS CO., Columbia, S. C. Docket G-1961 for a 160-mile pipeline in Aiken, Lexington, Richland, Orangeburg, Dorchester, Charleston, and Berkeley counties, S. C.

SOUTH GEORGIA NATURAL GAS CO., Birmingham. Docket G-1915 for a 339-mile line to serve communities in southwest Georgia and northern Florida. Main trunk would connect with system

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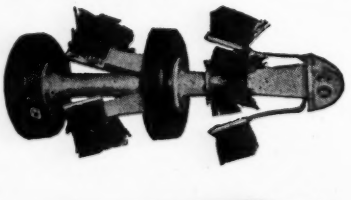

8" Size - TYPE WC-11. 8" to 14". Will traverse 6-foot radius field bends, full diameter side openings at 45°.
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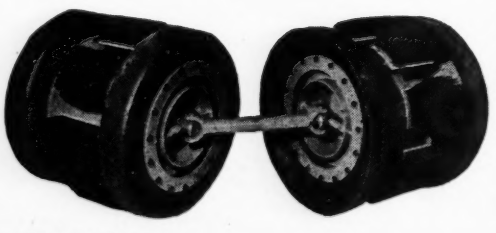
20" Size - TYPE GP-2. 16" to 30" 200-lb. SPRING forces the brushes against pipe wall — COMPENSATING for WEAR. Will traverse round opening gate or plug valves.
SPRINGS and BRUSHES are identical and interchangeable for all types and sizes of GP-PIGS.



24" Size - GP-3. 18" to 30". Sizes will pass 1½ R-30° Bends. SPRINGS COMPENSATE for BRUSH WEAR ASSURING full section cleaning efficiency.

GP-3 consists of two Type GP-1 Pigs —Each Unit may be used as individual pig.

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TULSA 9, OKLAHOMA

of Southern Natural Gas Co. in Lee county, Ala., and extend to Albany, Ga., with a branch to Tallahassee, Fla.

SOUTHERN NATURAL GAS CO., Birmingham. Docket G-1907 (partially approved). Application still open for 1102.2 miles of various size pipelines and three compressor stations totaling 13,850 hp in Alabama, Georgia, Mississippi.

TENNESSEE GAS TRANSMISSION CO., Houston. Dockets G-1921 and G-1922 for a presidential permit to construct and operate facilities at the International Boundary north of Niagara Falls and for FPC certificate for 45 miles of 20-in. from Buffalo to Niagara; 107 miles of 26- and 30-in. loop on mainline; six new compressor stations with 80,500 hp; 51,500 hp in old stations; 50 miles of laterals; aerial suspension bridge over Niagara river.

TEXAS-OHIO GAS CO., Houston. Docket G-1810 for 1411 miles of 30-in. from Hildalgo county, Texas, through Arkansas, Mississippi, Tennessee, Kentucky, Ohio, and terminating near Lancaster, Ohio, including 14 compressor stations totaling 135,000 hp.

TRANS-CANADA PIPE LINES LTD., for 2200-mile line from Alberta to major cities as far east as Montreal.

UNITED FUEL GAS CO., Charleston. Docket G-2061 for 50.5 miles of pipeline from new 2640-hp compressor station at existing storage pool in Wood county to Lanham station in Putnam county, W. Va. Also acquisition of leaseholds and authority to drill wells, install well and field lines for proposed new storage pool.

UNITED GAS PIPE LINE CO., Shreveport. Docket G-1951 for 31 miles of 20-in. line from an offshore gas field in the Gulf of Mexico to connect with line under construction in Terrebonne Parish, La.

UTAH NATURAL GAS CO., Salt Lake City. To build a 125-mile 20-in. line from Clear Creek wells in Carbon county to Salt Lake City.

WESTCOAST TRANSMISSION CO. INC., Wilmington, Del., 349 miles, including 277 miles from Sumas, Wash. to Portland, Ore. with short branches to a number of cities in the two states, and 72 miles of laterals and 13 measuring stations. To connect with 683 mile 24-in. line to be built by parent company, Westcoast Transmission Co. Ltd., from Peace river area of Alberta and B.C. Route being surveyed; air photography completed.

WILCOX TREND GATHERING SYSTEM INC., Dallas. Docket G-1959 for one 2200-hp compressor station and 217 miles of line in Lavaca, Jackson, Dewitt, Victoria, Bee, Goliad, Karnes, Live Oak, McMullen, and Duval counties, Texas.

Under Way

ALGONQUIN GAS TRANSMISSION CO., Boston. Facilities to serve designated companies in Massachusetts, Rhode Island, Connecticut, and New Jersey. Includes 253 miles of main line and 279 miles of laterals. Associated Pipeline Contractors Inc. at work on 200 miles in Massachusetts, Connecticut, and Rhode Island; J. F. Fitzgerald Construction Co., Boston, 10 miles near Waltham, Mass.

ARKANSAS-MISSOURI POWER CO., Blytheville. Docket G-1900 for a line from Campbell, Mo. to Blytheville, Ark., and a line from a point just west of the St. Francis river in Clay county, Ark. to Rector, Ark. The total of 140 miles of pipeline is to serve 13 communities in Arkansas and 5 in Missouri. Brown Lite Co., Tulsa, at work on 43 miles of 10-in. line from Campbell, Mo. to Blytheville, Ark.

ATLANTIC SEABOARD CORP., Charleston. Docket G-1850 for two new compressor stations aggregating 7640 hp, with 3080 hp addition to be installed in existing station, all in West Virginia. J. F. Pritchard Co. at work on all three projects.

CHICAGO DISTRICT PIPELINE CO., Joliet, Ill. Docket G-1756 to build 12.4-mile, 30-in. line in Cook county, Ill. Contracting & Material Co. at work near Ontarioville, Ill. Scheduled for completion Dec. 1, 1952.

EL PASO NATURAL GAS CO. Dockets G-1630, G-1631 for about 170 miles of 30-in. mainline

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COMPANY_____

NAME_____ POSITION_____

STREET CITY ZONE STATE

loop on existing transmission system, and about 153,000 hp in mainline and booster compressor stations.

HOPE NATURAL GAS CO., Clarksburg. Docket G-1946 for 33 miles of various size line to connect with present line in Wyoming county, W. Va., and extend into Buchanan county, Va. Expected to be complete in December.

LONE STAR GAS CO., Dallas. From Garvin county, Okla. to company's Petrolia (Clay county), Texas station, 70 miles of 20-in. Scheduled to be in service by early December. A 30-mile, 12-in. line from Miers gas field, Sutton county, to near Eldorado, under way.

MISSISSIPPI RIVER FUEL CORP., St. Louis. Docket G-1932 for construction of 17 compressor units, totaling 17,345 hp, in 7 existing stations in Arkansas and Missouri, and one new station in Missouri.

MOUNTAIN FUEL SUPPLY CO., Salt Lake City. Docket G-2003 for a 2640-hp compressor station in Uinta county, Wyo. Contracts have been let and work started.

NATURAL GAS STORAGE CO. OF ILLINOIS, Chicago. Docket G-1757 to build facilities to develop an underground storage area 15 miles from Kankakee, Ill. First stage approved, to include drilling of 25 wells; construction of 16.7 miles of 30-in. line to storage area; a 10,000-hp compressor station; various small lines, meters and auxiliary facilities. Contract for 30-in. line, various small lines, metering station, let to Ray L. Smith & Son. Work begun.

NORTHERN NATURAL GAS CO., Omaha, has Reese Brothers Construction Co. at work on 140 miles of gathering lines in Kansas and Oklahoma, 35 miles completed, remainder to be completed by January 1953. G. G. Griffis at work on laying 1.5 miles of 20-in. and removal of same amount 12-in. line in Dakota county, Minn.

SOUTHERN CALIFORNIA GAS CO. & SOUTHERN COUNTIES GAS CO., Los Angeles. A 13-mile section of 22-in. line with Ventura river crossing to complete line from Goleta field to Los Angeles. To be completed this year. Engineers Ltd. Pipeline Co. at work.

SOUTHERN CALIFORNIA GAS CO. and **SOUTHERN COUNTIES GAS CO.,** Los Angeles. Docket G-1718 for about 20 miles of 30-in. loop line east from Whitewater, Calif., and 13,520-hp additions to compressor facilities on existing line from California-Arizona boundary to Los Angeles. Construction on compressor under way; line work scheduled to begin in December.

SOUTHERN NATURAL GAS CO., Birmingham. Docket G-1993 for a 3300-hp compressor station to be located on company's 14-in. supply line from Logansport (La.) gas field.

SOUTHERN NATURAL GAS CO., Birmingham. Docket G-1676 for a total of 19,450 hp in three compressor stations in Jefferson Davis and Clarke counties, Miss. and Hale county, Ala.; 60 miles of line. Work under way on two stations; remainder complete.

SOUTHERN NATURAL GAS CO., Birmingham. Docket G-1907 (in part) for 87.8 miles of 24-in. and 4.7 miles of 14-in. loop line. Houston Contracting Co. has two spreads at work on 46 miles near Louisville, Miss., and 42 miles from Reform, Ala. to Warrior river.

TEXAS GAS TRANSMISSION CORP., Owensboro. Docket G-1847 for 408 miles of 26-in. loop line in six sections paralleling its line from Bastrop, La. to a point near Louisville, with installation of 28,860 hp in compressor facilities. H. C. Price Co. at work on 125-mile section between Greenville and Lake Cormorant, Miss., 40 miles completed Sept. 1; two spreads scheduled to begin in Tennessee—59-mile section, Sept. 22, 80-mile section Sept. 8. Houston Contracting Co. at work on 46-mile section from Bastrop to Miss. river near Greenville. Entire job expected to be completed before winter.

UNITED GAS PIPE LINE CO., Shreveport. Docket G-1880 to build 36-mile line from a point near Ingleside, Texas for connection with system near Refugio, Texas.

UNITED GAS PIPE LINE CO., Shreveport. Gulf Southern Contractors at work on 1017 miles of 6- to 30-in. line in Texas, Louisiana, and Missis-

sippi and offshore in the Gulf of Mexico. Expected to be completed in 1952.

UNITED NATURAL GAS CO., Oil City, Pa. Docket G-1854 for 15.1 miles 12-in line and replacement of 6.5 miles 8-in. line in Venango county, Pa. delayed by pipe deliveries; 12.4 miles 6-in. line and replacement of 2.7 miles of 3-in. line in Warren county, Pa., Case-Pomeroy Oil Corp. at work with Nov. 15 as scheduled completion date. This company also installing Allegheny river crossing.

WESTERN SLOPE GAS CO., Denver, 49 miles of main transmission line and 30 miles of gathering lines to bring natural gas to Grand Junction from the Douglas Creek field, Rio Blanco county; Germesa field, Garfield county; and Highline Canal and Asbury Creek fields in Mesa county. Fautz & Bursum, Farmington, N. M. are at work on this project.

Pending Construction

COLORADO-WYOMING GAS CO., Denver. Docket G-1821 for 1½-mile 8-in. loop near Cheyenne; 2-mile, 8-in. replacement on Golden, Colo. lateral; and 4-mile, 6-in. line to Rocky Flats Plant of the Atomic Energy Commission. Line to A.E.C. plant will probably be laid in 1952; remainder in 1953, depending on pipe deliveries.

MILWAUKEE GAS LIGHT CO., Milwaukee. Two lines, one 10 miles of 14- and 16-in. pipe extending south from Cedarburg to the Milwaukee county line and connection with the other, a 20-in. line extending east 7 miles from Menomonee Falls.

NEVADA NATURAL GAS PIPE LINE CO., Las Vegas. Docket G-1888 for 114 miles of 12¾-in. line from Topock, Ariz. to Las Vegas and Henderson areas. Construction scheduled to start about Feb. 1, 1953. H. G. Laub, pres., 7th & B St., Victorville, Calif.

NEW YORK STATE NATURAL GAS CORP., Pittsburgh, 23-mile, 20-in. line from Tonkin station to Valley Gate, Pa.; 13-mile, 14-in. line from Aurelius to Skaneateles, N. Y.

NORTHERN NATURAL GAS CO., Omaha. Docket G-1618 for 213 miles of 26-in. loop lines in Texas, Oklahoma, Iowa, Kansas, Nebraska and Minnesota, and 100,160-hp additional compressor capacity.

OHIO FUEL GAS CO., Columbus. Dockets G-1911 and G-1931 for 33 miles of 20-in. to replace 42 miles of existing 8⅝- and 10¾-in. pipe in Crawford, Wyandot, and Seneca counties, Ohio, and 4 miles of 8⅝-in. pipe in Richland county. Contract let to Ohio Pipe Line Construction Co.

OHIO RIVER PIPELINE CORP., Indianapolis. Docket G-1847 for 13½ miles from point near Louisville, Ky. to a point near Utica, Ind.

OKLAHOMA NATURAL GAS CO., Tulsa. To build 50-mile 18-in. line from Sapulpa to Pryor, Okla. to serve chemical plant to be constructed by Deere & Co. and Grand River Dam Authority furnaces.

PACIFIC GAS & ELECTRIC CO., San Francisco. Docket G-1651 for 86.25 miles 34-in. loop and 19,540 hp addition on existing Topock-Milpitas line.

PACIFIC GAS & ELECTRIC CO., San Francisco. Docket G-1892 for 20 miles of 16-in. line from Burrell to a point near Easton and 15 miles of 20-in. pipe extending from Helm and joining the system's Topock-Milpitas line in Fresno county; and for 15.5 miles of 12¾-in. in Madera county parallel to the existing Madera-Livingston line, scheduled for construction in 1953-54.

TENNESSEE GAS TRANSMISSION CO., Houston. Dockets G-1573 and G-1614 for 591 miles of line parallel to existing system, a 304-mile line from near Mercer, Pa. to Utica, N. Y. with a total of 165,000 hp to be installed at new and existing compressor stations. Also 250 miles of miscellaneous lines.

TENNESSEE GAS TRANSMISSION CO., Houston. Docket G-1930 for a 2640-hp compressor station in Carthage field, Panola county, Texas.

UNITED GAS PIPE LINE CO., Shreveport.

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Docket G-1879 for compressor stations at Napoleonville and Jackson, Miss., for 13,280 total hp; and an addition of 8000 hp at authorized stations near Montpelier, La., and in Walthall county, Miss.

Contracts Let

ARKANSAS-LOUISIANA GAS CO., Shreveport. Docket G-1979 for 6 miles of 12¾-in. line in Hot Spring county and a 7500-hp compressor station on the company's "Line S" between Waskom, Texas and Perla, Ark. Contract let to Delta Engineering Corp.

HOME GAS CO., Pittsburgh. Docket G-1893 for 13 miles of line in Chemung and Broome counties, N. Y. Contract let to H. L. Gentry Construction Co., Jackson, Mich.

MANUFACTURERS LIGHT & HEAT CO., Pittsburgh, Pa. Docket G-1893 (in part) for construction of 9.3 miles of line and retirement of 15 miles of line in Allegheny, Washington, Beaver, and Clarion counties, Pa.; retirement of compressor station in Lawrence county, Pa. and compressor unit Columbiana county, Ohio. Contract for line work in Allegheny and Washington counties let to Britton Construction Co.

TEXAS EASTERN TRANSMISSION CO., Shreveport. Docket G-1947 for 315 miles of 24-in. line from a point in Lavaca county, Texas to Castor, La. Contract let to H. B. Zachary Co., San Antonio, Texas, pending approval.

Approved

MIDSOUTH GAS CO., Little Rock, Ark. Dockets G-1445 and G-1680 for 191 miles of line in Greene, Crittenden, St. Francis, Lee, Phillips, Monroe, Woodruff, Poinsett, and Cross counties, Ark.; acquisition of 38-mile line from Texas Gas to Arkansas Power's generating station near Palestine, Ark.

NEW YORK STATE ELECTRIC & GAS CORP., Ithaca. Docket G-2000 for additional 1100 hp at Auburn compressor station and 9.5 miles 10-in. line paralleling present line from Auburn to Seneca Falls. Construction under way.

NEW YORK STATE NATURAL GAS CORP., Pittsburgh. Docket G-1980 (in part) for a 20-mile, 16-in. line from Leidy compressor station, Clinton county, to Driftwood gas field, Cameron county; 970-ft, 20-in. line connecting Sabinsville compressor station to transmission line, Tioga county.

PANHANDLE EASTERN PIPELINE CO., Kansas City, Mo. Docket G-2037 for 6.5 miles of 6-in. line in Logan county, 13.2 miles 20-in. in Sangamon county, and a new 330-hp compressor station in Peoria county, Ill. Contract for line work let to Somerville Const. Co. Right-of-way being cleared in Sangamon county.

PUBLIC SERVICE ELECTRIC & GAS CO., Newark, N. J. Docket G-2021 for 11.13 miles of 16-in. line from connection with Texas Eastern to Harrison; 2.96 miles of 10-in. and 2.04 miles of 12-in. from Harrison to Harrison Gas Works and West End Gas Works, Jersey City.

PIPELINE PEOPLE

R. K. Shivel

Several changes in supervision of H. C. Price Co.'s construction operations were announced recently following the appointment of JOHN M. THOMAS as vice president in charge of the pipeline division. ROBERT K. SHIVEL, veteran spread superintendent, was named superintendent of the division. He is succeeded as superintendent of spread two by ROBERT L. EZELL, welding foreman of the Bartlesville, Okla. company for many years. ROY E. BURGESS was named administrative manager of the pipeline division and HAROLD C. PRICE JR. administrative assistant.

Donald B. Ross

Effective Sept. 1, DONALD B. ROSS joined the firm of Sawyer-Jensen Co., Tulsa, as a partner, and the firm name was changed to Sawyer-Jensen-Ross. The company manufactures specialized pipeline and refinery equipment. Mr. Ross will handle promotion and sales of present products and will work with customers on development of new equipment items for particular problems. Mr. Ross was formerly manager of industrial and export sales for the Kobe division of Dresser Industries in Cleveland, Ohio and New York City.

W. C. NORMAN, who has held the dual position of vice president of Tennessee Gas Transmission Co., Houston, and president of its New England subsidiary, Northeastern Gas Transmission Co., Springfield, Mass., is now a general partner of the New York capital investment firm of Lambert & Co. Assuming Mr. Norman's former duties are GARDINER SYMONDS, TGT's president and chairman of the board of Northeastern, now

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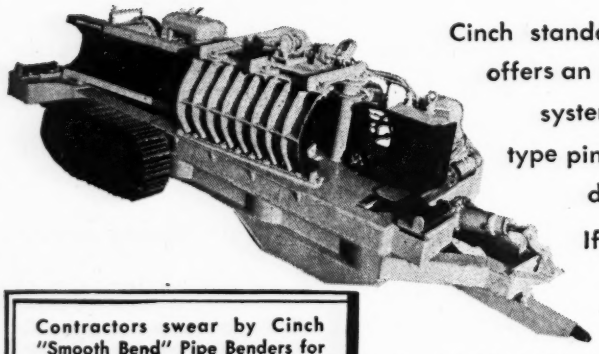

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